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« EDITORIAL »

Safeguards Against Fires On Merchant Vessels

SERIOUS losses by fire on vessels during construction or overhauling and repair, and while in lay-up, make it imperative to take some practical action to prevent such fires in the future. Such action is suggested in two new important sets of regulations drawn up by the marine committee of the National Fire Protection association. This committee under the chairmanship of S. D. McComb is presenting these regulations for tentative adoption at the annual meeting of the association held at Milwaukee, May 29, June 1.

Since the proposed rules have a wide application and affect the design and arrangement of new vessels in important particulars, the committee welcomes suggestions from the shipping industry to increase their usefulness.

One part of the regulations as proposed cover safeguards for the prevention of fire on vessels in the course of construction, repair and during layup. The other part covers fire resisting construction of vessels in ocean and coastwise service. These regulations have been drawn up by conference committees composed of representatives of classification societies, designers, builders, ship repairers, ship operators and underwriters. Much time and study have been devoted to the work.

Attention is called to the number of fires on large passenger steamers during the past two years. The latest of these, the *L'ATLANTIQUE*, French liner, took fire in the English channel, January, 1933; a comparatively new ship of 42,512 gross tons, built in 1931, the loss to underwriters is about \$7,000,000. The total loss was considerably more.

Other fire losses mentioned are the new liner *GEORGES PHILIPPAR* in May, 1932. This vessel of 17,359 gross tons, built in 1931, operated between Marseilles and the Far East, burned on a voyage in the Red sea. The loss is about \$5,000,000. The fine Dutch motorship *PIETER C. HOOFT*, of 14,729 gross tons, burned at Amsterdam in November, 1932 with a loss of about

\$3,500,000. The steamer *BERMUDA*, of 19,085 gross tons, seriously damaged by fire at her dock at Bermuda and later at Belfast when repairs had been about completed, was a total loss by fire. The loss amounted to about \$5,000,000. Still other vessels mentioned are: the *CITY OF HONOLULU*, burned at Honolulu with a loss of about \$2,000,000; the liner *PARIS* of 34,569 tons, badly damaged by fire while being repaired at Havre; the liner *EUROPA* burned at the builder's yard when nearly completed; and the *SEGOVIA* of about 7000 gross tons, also burned at the builder's yard.

It is urged that the same principles of fire prevention and fire protection be applied to ships which have been applied successfully to the construction of buildings. The regulations include requirements for fire incombustible material, the subdivision of each ship into definite fire areas and the enclosure of stairways and other vertical communications to prevent the spread of fire from deck to deck. The maintenance of cleanliness, supervision of well known fire hazards, the provision of water supply and fire alarm and watchman service are the simple but important regulations called for to protect ships during construction and repair and lay-up.

The committee feels that every reasonable means of preventing fire should be provided and supplemented by means of detection and protection to permit prompt discovery, to retard the spread and to make possible putting out any fire before it has passed the incipient stage.

Members of the conference committee which drew up the recommended safeguards in both sets of regulations are men of the highest professional standing and practical knowledge and it can safely be said that these regulations will be effective for the purpose intended and are also entirely reasonable and practical.

The rules are now being presented for tentative action in order to make possible constructive criticisms which are earnestly solicited. Suggestions may be made in writing to the marine committee of the National Fire Protection association, 60 Batterymarch street, Boston. Copies of the proposed regulations are available at the same address.

WASHINGTON

Sailed on Maiden Voyage May 10

THE completion and entry into service of the S. S. WASHINGTON in transatlantic run as a companion to her sister ship MANHATTAN marks the greatest achievement in the development of the new American merchant marine. The new liner shares the distinction with the MANHATTAN of being the largest and most powerful merchant ship ever built in the United States. She sailed from New York on her maiden voyage for Cobh, Plymouth, Havre and Hamburg on May 10. Her passenger list exceeded 740. She carried the largest number of cabin passengers up to that time by any cabin steamer this year, and she also was full in both tourist and third class. The instant success of the MANHATTAN when she entered service last August seems certain to be duplicated by this fine sistership.

The WASHINGTON arrived at New York on April 30 from the yards of her builder, the New York Shipbuilding Co., Camden, N. J., after successful sea-trials. An enthusiastic reception was accorded her. On May 1 she moved to the Robins plant, Brooklyn, N. Y., of the Todd Shipyards Corp., and entered the largest graving dock in the port of New York. She had not been dry docked since her launching last August and was given a thorough cleaning and repainting. Though the WASHINGTON is the largest vessel so far to have entered this dry dock, the docking was accomplished in quick time and without any difficulty whatsoever. After dry docking she returned on the morning of May 2 to Pier 61, Hudson river, where preparations began for her maiden voyage.

The ceremony for the formal delivery of the new liner took place at 3 p.m., May 2, at the office of the collector of the port. The United States lines, as owner, was represented by Basil Harris, and the New York Shipbuilding Co. as builder was represented by John S. Ritchie. The vessel was registered at the custom house. Later in the day the United States lines house flag, a blue spread eagle on a white ground, took the place of the builder's flag.

Reports of the maiden voyage over indicate that she behaved perfectly and that she maintained an average speed

of 20½ knots, making a good crossing, and arriving at Plymouth on May 17. Her return voyage is scheduled for May 24 with arrival in New York June 1.

Washington Sea Trials

The S. S. WASHINGTON left the shipyard, Camden, N. J., April 29 at 4:48 a.m., and proceeded down the Delaware river for her official trials off the New Jersey coast while enroute to New York for delivery to the owner.

Arriving off the lower Delaware, she proceeded out to sea gradually building up to full speed for steering gear trials which were started at 3:45 p.m. She made the figure 8 with the main steering gear ahead followed by steering astern and then ahead and astern with the main gear disconnected and the auxiliary steering gear in operation. These maneuvers were carried through with complete success, and according to Capt. George Fried, who was a passenger on board, she handled perfectly and to complete satisfaction from a navigator's point of view.

The anchor windlass tests were not required on this voyage since this equipment had been officially tested during the builder's trials made earlier in the month.

After successful completion of the steering gear tests the WASHINGTON continued out to sea at full power, on an 8-hour fuel consumption run starting at 9:15 p.m. During this run the vessel was on a trial draft of 23 feet, 11 inches at a displacement of 25,270 tons. Though the speed attained has not been officially given out by the shipyard or the owner, it is understood that her average speed in this condition during the 8-hour full power trials

Principal Characteristics

Builder.....	New York Shipbuilding Co.
Owner.....	United States Lines
Contract signed.....	May 24, 1930
Keel laid.....	Jan. 20, 1931
Launched.....	Aug. 20, 1932
Delivered.....	May 2, 1933
Length overall, feet, inches.....	705—0
Length on waterline, feet, inches.....	685—0
Length between p. p., feet, inches.....	666—0
Beam molded, feet, inches.....	86—0
Depth to C deck molded, feet, inches.....	47—0
Depth to promenade deck, feet, inches.....	75—0
Load draft, designed, feet, inches.....	30—0
Deadweight, on load draft, tons.....	12,000
Displacement at 30 ft., 8¾ in., tons.....	33,500
Gross tonnage,	24,289
Net tonnage, about	13,900
Speed, normal, in service, knots.....	20
Shaft horsepower in service.....	30,000
General cargo, cubic feet.....	374,240
Refrigerated cargo, cubic feet.....	47,090
Bunker fuel capacity, tons.....	4,775
Propelling machinery, twin screw, two sets of single reduction geared turbines, each transmitting 15,000 h.p. to its propeller at 125 r.p.m., total brake horsepower.....	30,000
Passenger capacity, in three classes.....	1,083
Cabin class	576
Tourist class	366
Third class	141
Crew, total number	478
Passengers and crew total.....	1,561
Cost	\$10,500,000
Classification.....	American Bureau of Shipping



T. S. S. Washington entering New York harbor, April 30, after her successful sea trials

was 22.1 knots.

The summarized results of the 8-hour full power trial run are as follows: shaft horsepower of main turbines, 33,534; shaft horsepower of main turbine and auxiliary generators, 34,610; revolutions per minute of propellers, 124.9; fuel consumption, (corrected to 18,500 B.t.u. oil) for all purposes per shaft horsepower per hour of main and auxiliary turbines, .595 pound.

This fuel consumption of .595 pound per shaft horsepower per hour for all purposes is considerably better than the guaranteed figure of .65 pound. It is also slightly under the figure of .597 pound obtained on the sister ship MANHATTAN during the complete trials in July, 1932, including the standard-

Grand salon on the Washington. American Colonial adaptation of the Georgian style. Paneled in walnut. Broken by fluted pillars. Two decks in height



Smoking room on the Washington. Early American. Decorations adapted from the life and art of the American Indian. The murals are of Indian scenes

ization runs, on a measured mile course at Rockland, Me.

After completion of the 8-hour run, the S. S. WASHINGTON proceeded to New York and docked at the United States lines Pier No. 61, North river, at 3:30 p.m., eastern standard time, April 30.

During her stay in New York prior to sailing on her maiden voyage, May 10, numerous private and public functions were held on board, and a large number of people had the opportunity of inspecting this magnificent new flagship of the American merchant marine.

Similar to the Manhattan

As the WASHINGTON is a sister ship of the MANHATTAN and identical in all except minor details, the descriptive article on this latter vessel published in MARINE REVIEW for September, 1932, will give full particulars concerning her hull construction, machinery, auxiliaries and equipment.

A number of changes, however, have been made in passenger quarters. On the promenade deck on the WASHINGTON the writing room and library have been made into one room by eliminating the middle line bulkhead. The lobbies between the palm court and the grand salon have been enlarged and rearranged. The decorative color

scheme in all the public rooms on the promenade deck has been changed. On the A deck the arrangements are practically unchanged. The color scheme and the hard wood finish, however, are different. On the B deck all the outboard staterooms have private toilet accommodations, and the port side of this deck has been arranged for interchangeability to tourist class.

On C deck all the outboard cabin class staterooms have been fitted with private toilet accommodations. Eight tourist staterooms on this deck also have private toilets. The color scheme in the cabin class dining room has been changed.

On D deck all the outboard cabin class staterooms have private toilet accommodations. The color scheme of the swimming pool is changed. The tourist staterooms have been arranged to provide a number of bibby rooms, also, 40 private toilets have been installed. The port side of this deck is arranged for interchangeability to third class. The third class accommodations aft have been rearranged and the third class smoking lounge and children's play rooms have been added.

The third class dining room on E deck has been arranged to extend across the ship and to seat about 60 additional persons. A number of the third class staterooms have been ar-

ranged bibby fashion. The ship's refrigerator has been shifted to a position between the boiler casing.

The commissioning of the WASHINGTON ushers in a new era for American shipping. With her splendid sister ship, the MANHATTAN, the WASHINGTON again makes it possible after a quarter of a century of eclipse, for the United States to assume a leading position as a maritime power.

Winning Recognition

The phenomenal success of the MANHATTAN in her first year has shown how eagerly Americans have welcomed the newcomer and how ready they are to put to sea under the American flag given ships worthy to carry that flag on the high seas.

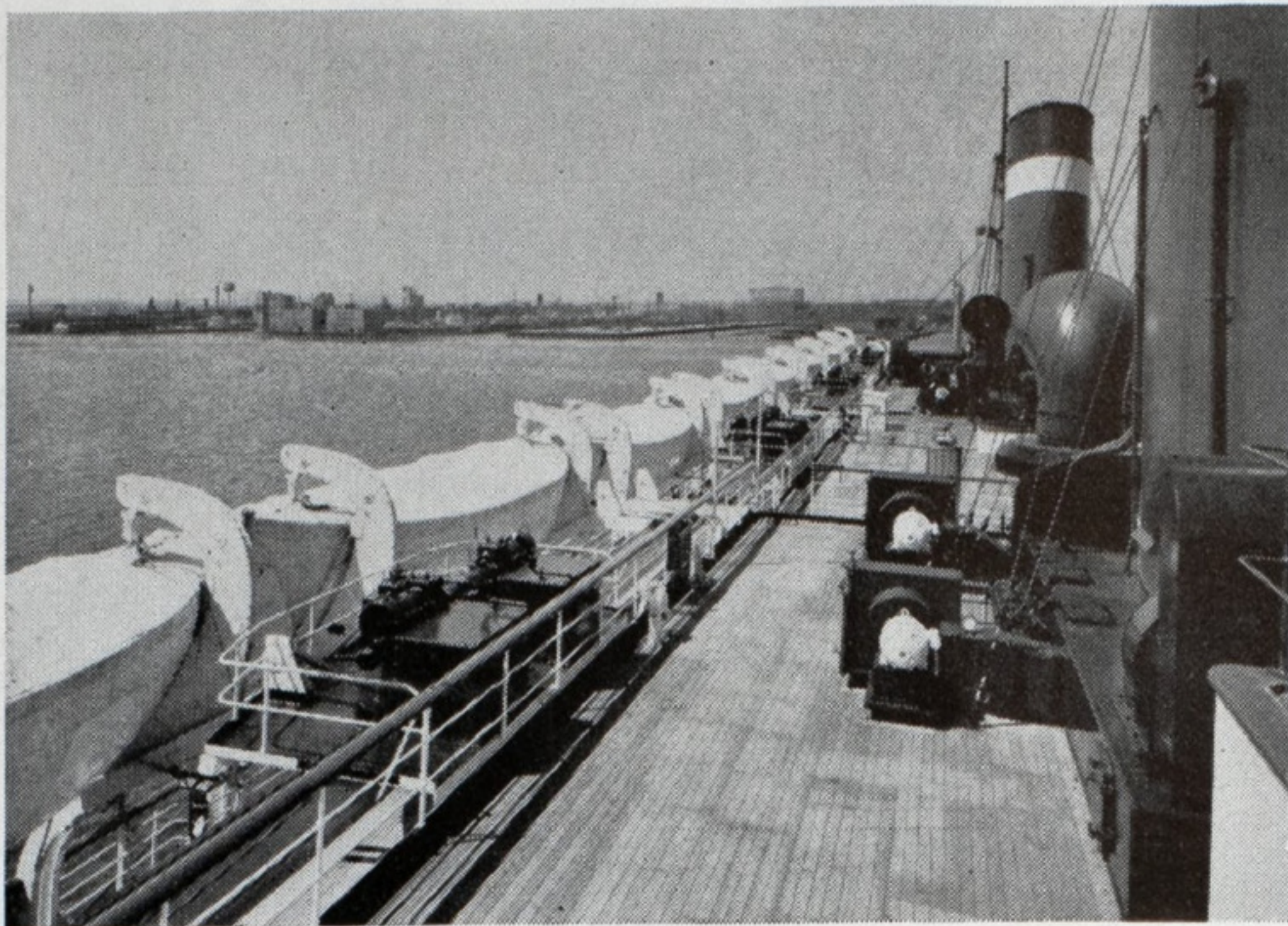
Since her maiden voyage last August, the MANHATTAN has carried 10,481 passengers, an average of 1162 for each of the nine round voyages. And this record was made in the worst traveling year since 1914.

It took courage and faith to put a new ship into commission in 1932, but the splendid support which the traveling public has given the MANHATTAN has more than justified her owner in commissioning her sister ship this year.

With the MANHATTAN, now one of the most popular liners on the Atlantic, the WASHINGTON will ply regularly between New York and Hamburg, via Cobh, calling at Plymouth and Havre eastbound, and at Havre and Southampton westbound.

The WASHINGTON was launched on Aug. 20, 1932 in the presence of 12,000 people just 10 days after New York had speeded the MANHATTAN on her maiden voyage. Mrs. T. V. O'Connor, wife of the then chairman of the shipping board, as sponsor, christened the vessel WASHINGTON, after the nation's capital, with water drawn from the old spring at Mount Vernon, George Washington's estate on the Potomac.

In outward appearance the WASHINGTON cannot be distinguished even by an expert from her sistership. She has the same features that give the



Sun deck of the S. S. Washington. Showing the steel life boats and gravity davits and winches for lowering and retrieving boats

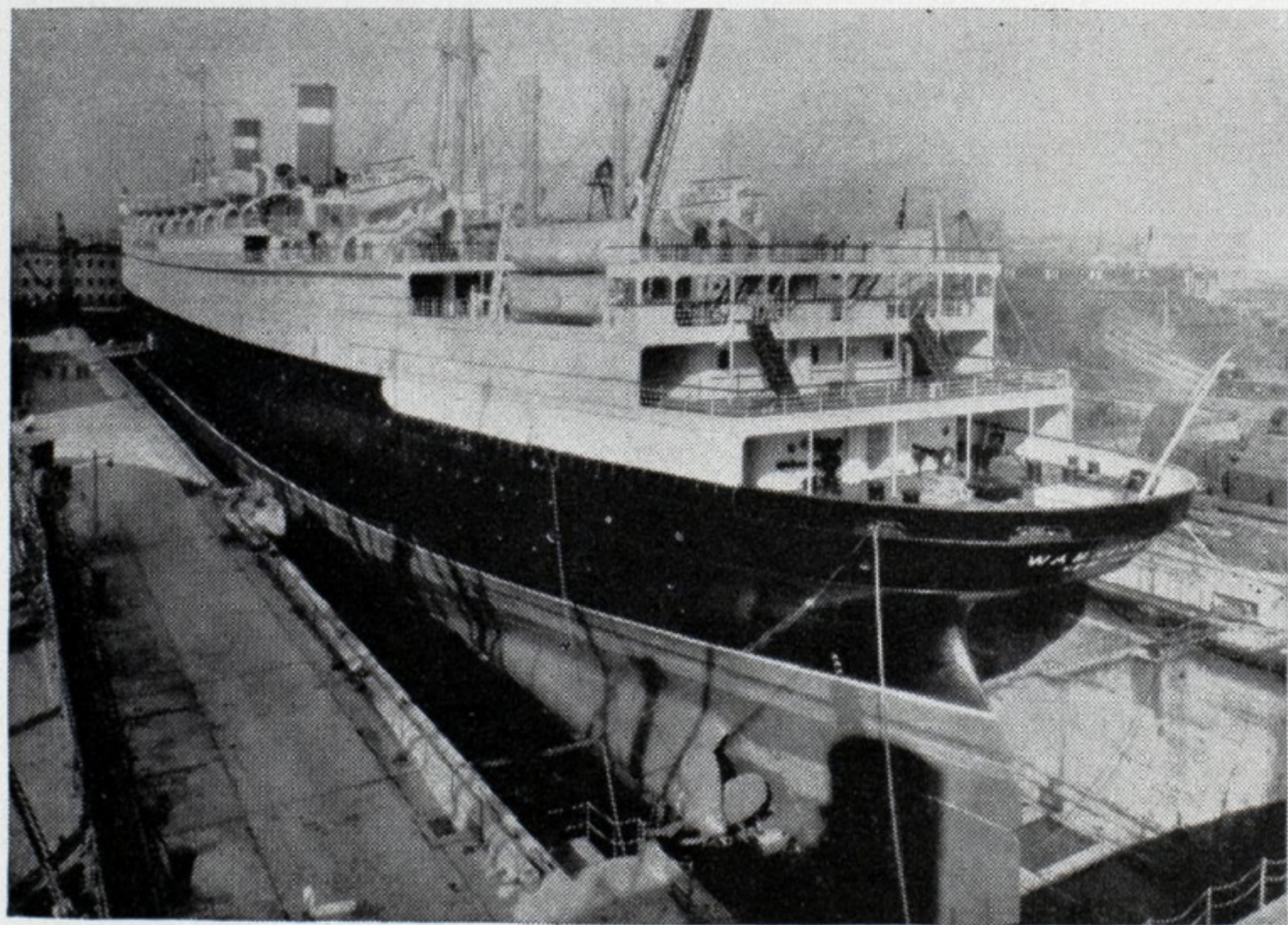
MANHATTAN a distinctive appearance at sea; straight raked stem and merchant cruiser stern, widely spaced elliptical funnels, with smart red, white and blue bandings, well placed masts, black hull and white topsides.

New Developments Incorporated

While the WASHINGTON was built from virtually the same plans as the MANHATTAN, the builder kept pace with every new development in naval architecture and marine engineering during the two years that the ship was

as the score of murals by Aldo Lazari that ornament important wall and ceiling spaces in the rooms given over to the social life of the ship. Since the name of the new vessel is one that symbolizes, more than any other, America's early days, most of these paintings which form so important an adjunct to the architectural scheme, depict various phases of America's Colonial life.

The twelve charming suites on A deck are furnished in period styles, and all the rooms on A and B decks



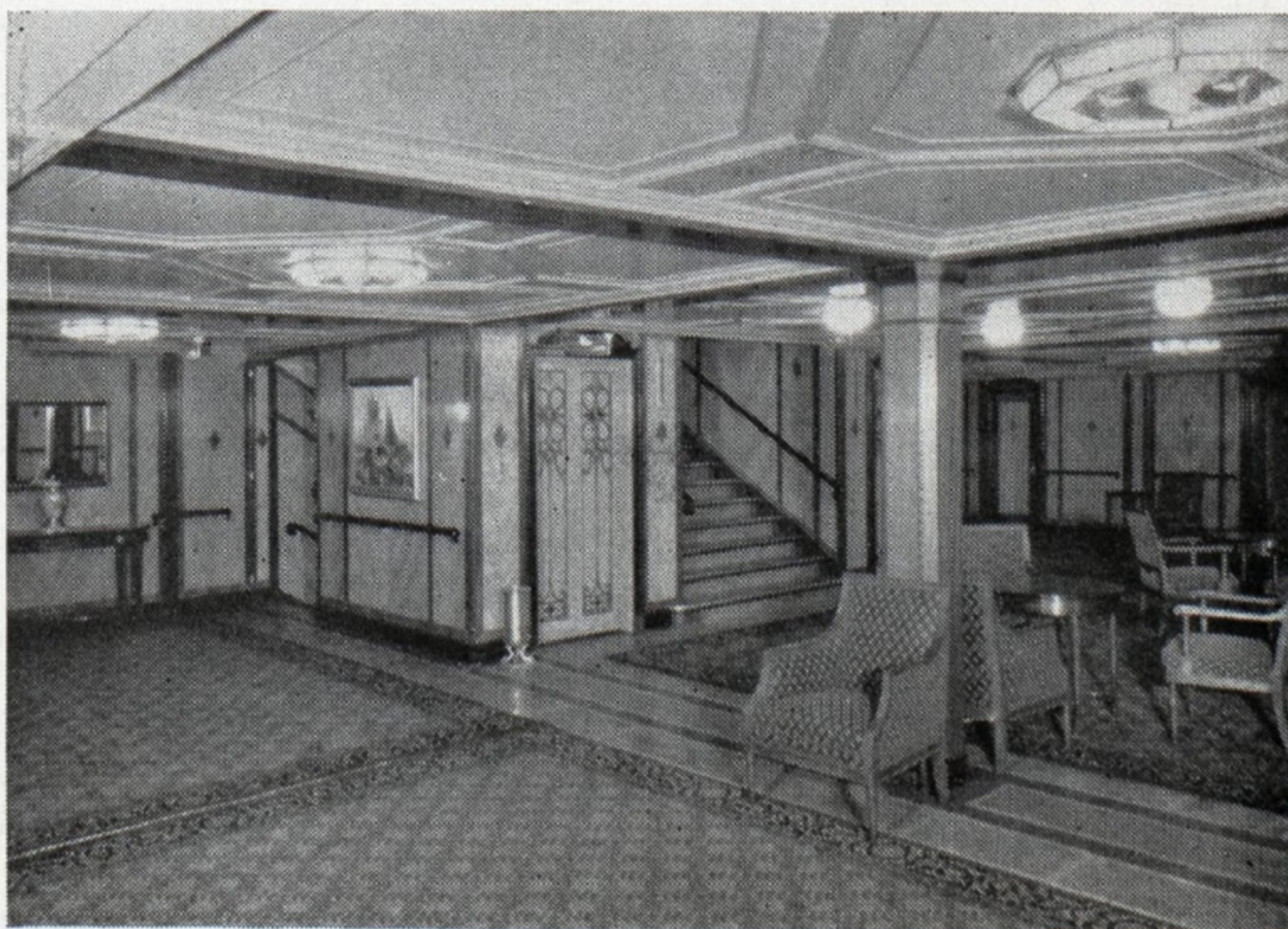
S. S. Washington in dry dock at the Robins plant, Brooklyn, N. Y., of Todds Shipyards Corp., prior to sailing on her maiden voyage. Said to be the largest vessel to dry dock in New York harbor

under construction. Certain new requirements which make her the last word in steamship design and construction have been incorporated. For comfort and convenience and for artistic treatment of decoration, these vessels achieve a standard of taste and efficiency that would have amazed the deluxe traveler of even ten years ago.

A few minor structural changes give the WASHINGTON individuality and the decorators, while duplicating the charming period styles, followed in designing the public rooms and cabins of the MANHATTAN, have worked out entirely different and very attractive color schemes for the rooms and carried them out in exquisite fabrics.

No one feature, however, so completely individualizes the WASHINGTON

Cabin foyer. Well ordered simplicity of treatment makes this space particularly pleasing and attractive



are arranged so that they can be sold as suites if desired. A large percentage of the cabin class rooms have connecting private bath or shower and all other rooms on the ship have hot and cold running water. No salt water is used for bath tubs, showers, or lavatories. All water for washing purposes in all classes being furnished from the ship's ample fresh water reservoir.

Elevators and Electric Galleys

An important feature in the ship with eight decks devoted to passenger accommodations are two passenger elevators located on either side of the main stairways forward, which run between D deck and the boat deck and can make six stops. Beautifully hand-wrought grilles make the elevator doors an ornamental feature of the foyers into which they open.

With 8400 square feet on C deck devoted to galleys and pantries for serving cabin and tourist class and an elaborate aggregation of electrical machinery for labor and time saving, the steward's staff on the WASHINGTON is well equipped to handle the job of serving 5000 complete meals a day. A battery of 12 electric ranges, 4 x 3½ feet in top area, occupy the center section, along with three huge steam tables. In addition to these ranges, there are two broilers, deep fat fryer, and a rotisserie, all electric; in the grill room, an electric bake oven and a pastry shop and two in the bake shop.

The WASHINGTON represents a high standard of safety in structural strength, watertight subdivision and general seaworthiness for North Atlantic service. The ship has been subdivided to a higher standard than required by the regulations of the international conference for safety of life at sea. (1929). The subdivision is in excess of any proposed standard including the recommendations of various bulkhead committees in this country and abroad.

Machinery and boiler compartments have also been arranged so as to secure the greatest safety and to permit the vessel to reach port from mid

ocean in case of damage. Wing tanks for fuel oil in way of boiler and auxiliary machinery rooms add greatly to side protection as they are carried up to above the fully loaded draft.

THE WASHINGTON has, of course, also been built and equipped in accordance with the rules of the supervising inspector of steam vessels, of the United States public health service, and to the requirements of the American Bureau of Shipping.

Powerful Radio Equipment

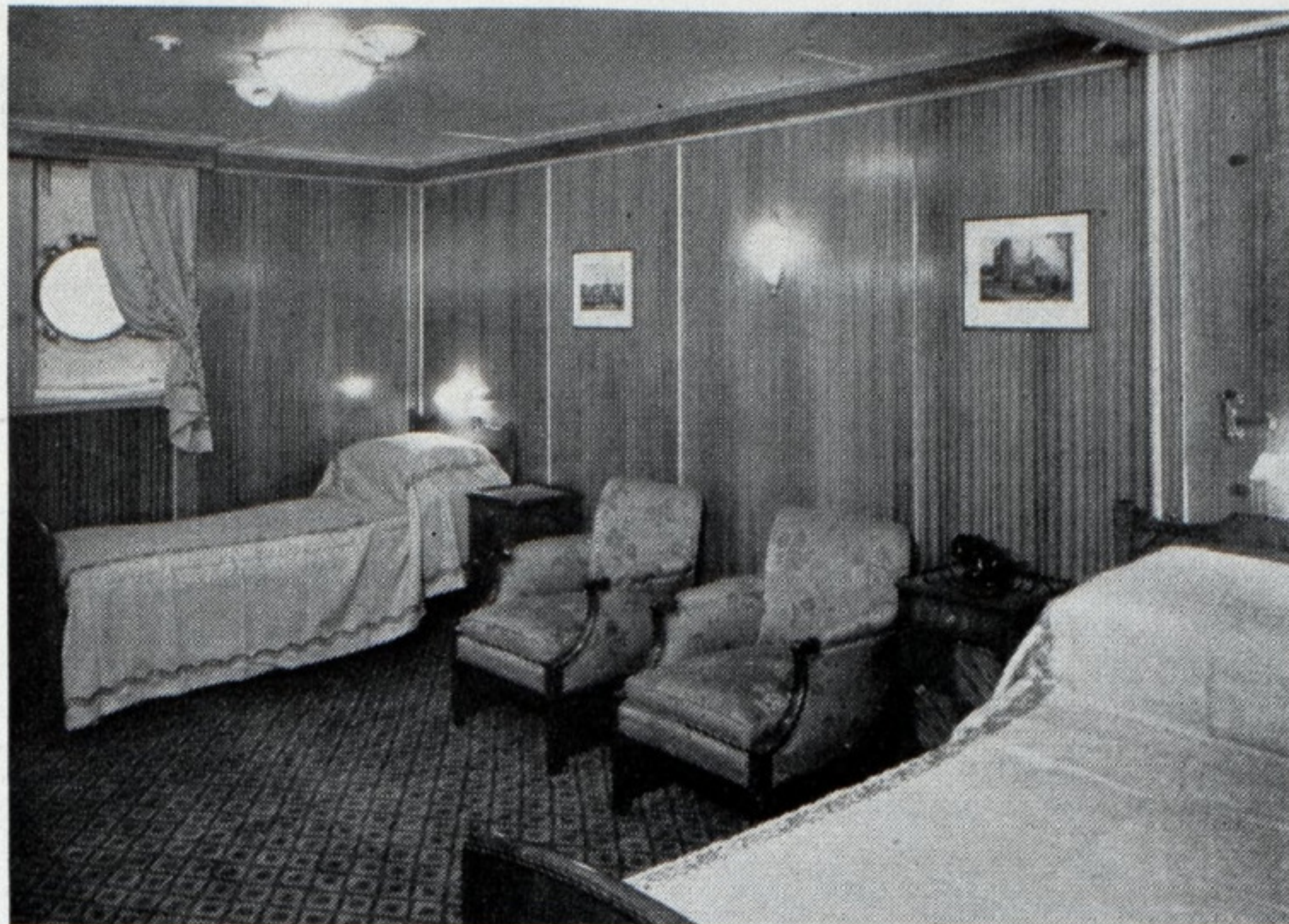
The WASHINGTON carries a powerful radio telegraph equipment of the most advanced type. This equipment was furnished and is operated by the Mackay Radio and Telegraph Co. The equipment includes not only a powerful sending and receiving apparatus for the convenience of passengers in sending messages to all parts of the world, but also emergency radio telegraph equipment independent of the ship's regular power supply, and a Kolster radio direction finder to assist in navigating the vessel. To carry on these varied and exacting services, the vessel is equipped with a total of six radio telegraph transmitters. Four of these are located in the radio room and one in each of the two motor lifeboats. Adequate reception under all conditions is insured by five complete receiving sets.

The propelling machinery of the WASHINGTON is similar to that for the MANHATTAN and was designed, built and installed by the New York Shipbuilding Co. The propelling plant as a whole is rugged, is commercially sound and is highly efficient. Experience on the MANHATTAN with her machinery has been very satisfactory and the general consensus of opinion is highly favorable to the quality of design and construction.

There are two sets of triple series turbines direct connected to propeller shafts by single reduction gears.

Steam conditions for the high pressure turbine is 390 pounds per square inch absolute with a temperature of 650 degrees Fahr. At a propeller speed of 125 revolutions per minute, the turbine speed is about 1500 revo-

One of the cabin staterooms on A deck. These rooms are paneled in various finished hard woods. Each of these cabins has a private bath



lutions per minute, developing a normal power of 15,000 shaft horsepower for each propeller.

Steam is supplied by six Babcock & Wilcox, express watertube, marine boilers, each of 10,500 square feet, boiler heating surface, 2507 square feet of superheating surface, and 8207 square feet of air heating surface. The boilers are built for a working pressure of 409 pounds per square inch.

Every effort has been made to remove causes of vibration. Machinery has been so carefully adjusted that

vibration is a negligible quantity.

Before installation, all turbines were run in the shops at 15 per cent above operating speed. This was done to prove both strength and smooth running. To demonstrate the absence of vibration, coins placed on edge on turbine bearing caps had to remain standing on edge during the test.

That there is business to be had for ships which satisfy present day demands is evident from the good showing made by the WASHINGTON in sailing on her maiden voyage from New

Library on the Washington. A richly paneled room in Tudor Elizabethan. Library and writing room has a central section and two wings



Dining saloon on the Washington in Louis XVI style. Cream and ivory wall paneling. Decorated with gold and pastel colors. A two deck center well with murals on ceilings and walls



York for Cobh, Plymouth, Havre and Hamburg with about 750 passengers in cabin, tourist and third class. This is an unusually large number for this time of the year. In an article by John Kelly in the *New York Herald Tribune* the following comment is made:

"While the great bookings on the WASHINGTON can be attributed to the fact that the liner is making her initial voyage, the number of reservations that have been made for her subsequent sailings have been amazing. The same is true of the liner's sistership MANHATTAN, which entered service last summer. From present indications the two popular cabin liners will make a number of eastbound and westbound voyages booked to capacity.

S.S. President Madison Raised by Unique Methods

By R. C. Hill

ONE of the oddest mishaps in Pacific coast shipping occurred at Seattle March 24, when the American mail liner *PRESIDENT MADISON* filled and sank at a pier at the plant of Todd Dry Docks, Inc. One life was lost but many members of the crew had miraculous escapes. The cause of the disaster was not ascertained. In the meantime the United States inspectors are making an investigation.

Upon her arrival from the Orient one strip of plates, 90 feet in length, were taken off about six feet above the water line on the starboard side. The steel had been dented in a slight accident and the plates were to be faired. The liner shifted to the repair plant where workmen were engaged on a scow alongside. The day before the vessel, with the open gap in her side, had shifted from a discharge pier. At the time she had a slight list to port. Suddenly she took a list to starboard, the open space went below the water and in a few minutes the vessel filled and sank. Her upper works resting on the adjoining pier prevented complete submersion. It is surmised that pumping out of ballast or oil tanks caused the disaster.

Adopting unique and drastic methods, underwriters' salvors succeeded in raising the 14,187 gross-ton trans-Pacific liner *PRESIDENT MADISON* in 19 days. Experts predicted that the job would require at least 60 days while some branded the vessel a total loss.

Lying at a drydock pier in Seattle, the *PRESIDENT MADISON*, 517 feet in length, took a sudden list shoreward and as she heeled over, water rushed in through an opening in the hull 6

feet wide by 90 feet in length where three plates had been removed for repairs. Within a few minutes the liner was submerged up to the bridge on the starboard side, where she lay at an angle of 51 degrees. The vessel's weight on the pier partially crushed that structure.

The job of raising the vessel, undertaken by the Pacific Salvage Co., presented unusual difficulties. At first holding gear had to be rigged in order to prevent the vessel's completely crushing the wharf and further digging her way into the mud at the bottom where she lay imbedded.

Unusual Difficulties Encountered

One emergency was met by obtaining 50 steel tanks which were lashed on the port or upper side of the hull. When filled with sea water they exerted a weight of 700 tons, counterbalancing in part the vessel's list to starboard. Four 10-ton anchors were dropped in the bay about 1000 feet from the ship and to these lines were made fast to the vessel's kingposts. When drawn tight these cables prevented further list. As a third preventive measure the salvors fastened strong cables or parbuckling gear to the vessel on the port or upper side, led these cables under the keel then under the adjoining pier and fastened them to specially constructed timber masts erected on the farther side of the pier. With the pull exerted by a steam engine the crippled liner was held in place.

Upon completion of these emergency measures the salvors began sealing operations. In other words every hole in the hull under water

had to be plugged before pumping operations could begin. Nine divers worked for days exploring every inch of the submerged portion. There were 250 open ports and other holes which had to be plugged with wood. The after hatches were under water. Special coffer dams were floated over them. To plug the large opening on the forward starboard side where the plates had been removed required special skill. Piece by piece, 8 x 12-inch timbers and 2 x 12-inch planks were lowered. These were placed by the divers who bolted them to the hull. Over this wooden frame filling the opening canvas was drawn, fastened by wood battens. In the meantime all deck gear, such as booms, lifeboats, ventilators, etc., were removed to relieve the top heaviness.

Coincident with these operations 16 powerful pumps were installed and upon completion of the sealing operations, pumping was started. Around the canvas plug, sawdust was released and as the suction from the inside asserted itself, the sawdust was drawn into crevices and as it swelled helped to perfect the sealing. At one time the pumps handled 80,000 gallons per minute. As pumping progressed the cables under the hull were drawn tight, a pull was exerted on the offshore anchors while the water filled tanks by means of gravity served to reduce the list.

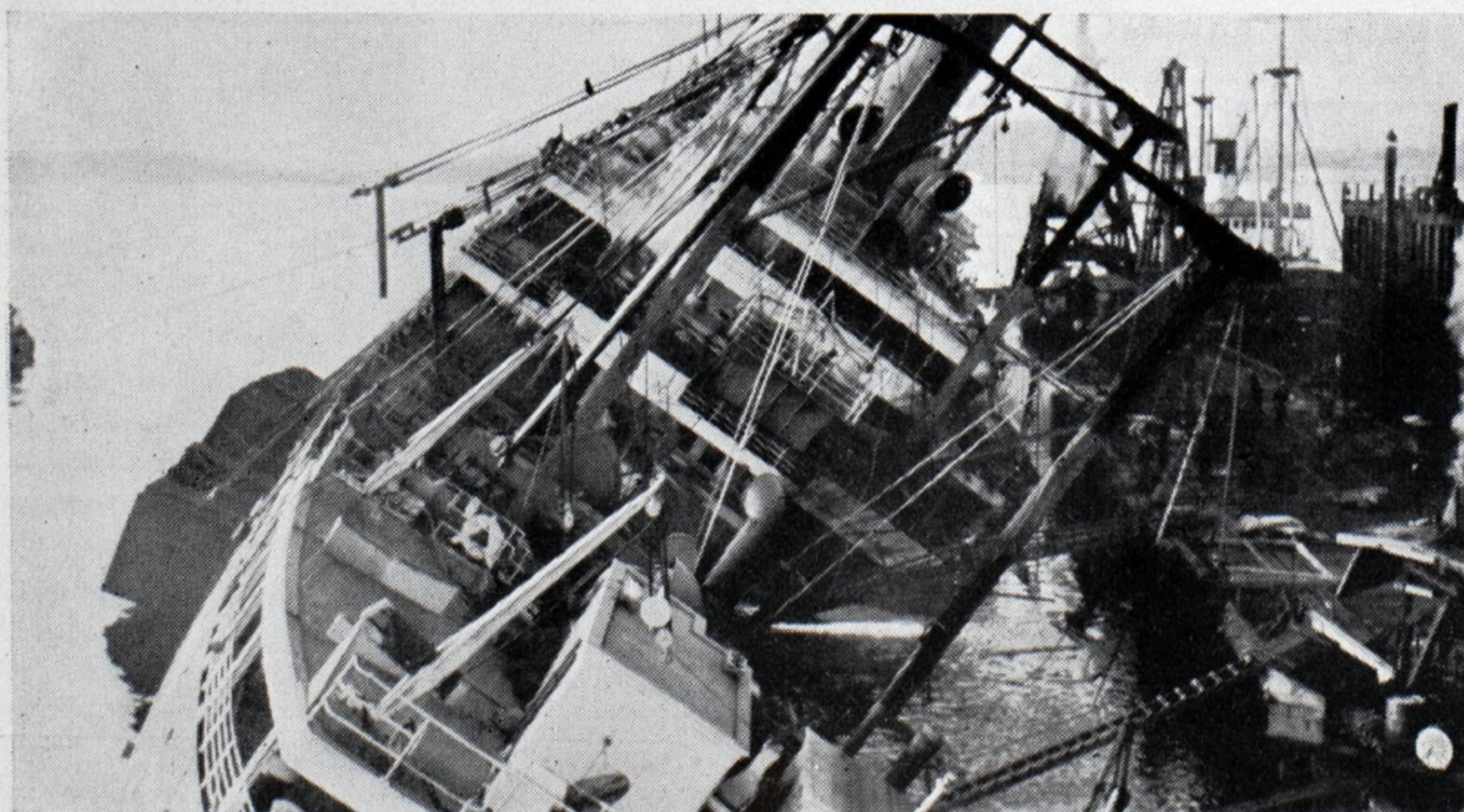
While the plan of using the water filled tanks as a counterbalance, excited some doubt, as the method is said to be entirely new in operations of this kind, this expedient is given much credit for the fast and successful outcome of salvage efforts.

Alfred M. Crane Dies

Alfred M. Crane, for many years president of Theodore A. Crane's Sons shipbuilding and ship repair company, Brooklyn, N. Y. and now one of the plants of the United Dry Docks Inc., died at his home at Hotel Bossert, Brooklyn, N. Y., on May 6. He was 64 years of age and retired from active business two years ago.

He was the son of Theodore A. Crane and Susan Harper Crane, and was born in Brooklyn, N. Y. He joined his father's company in his early youth and was actively connected with its management until his retirement. The first steam lighter for New York harbor is said to have been built at the yard of Theodore A. Crane's Sons. This company was also widely known for building wooden dump scows, barges and lighters. In later years the company carried on a large business in general ship repairs and dry docking.

Mr. Crane who was a bachelor, is survived by three brothers, Walter D. Crane, Frank H. Crane, and Wilbur H. Crane and three sisters.



Raising the transpacific liner President Madison at the dock of Todd Dry Docks Inc., Seattle, Wash., where she capsized and sank on March 24

American Ships in Overseas Trade

Aid Nation's Commerce and Industry

By Joseph T. Lykes*

THE merchant marine is America's oldest industry. The Colonists launched a ship as early as 1607. Once our sailors ruled the seas. Then America turned inland to the development of the West, and our magnificent heritage of sea greatness was allowed to die. We came to the World war with only 17 American steamers engaged in foreign trade. This decline can be attributed to our higher standard of living as compared with foreign nations.

The cost of building cargo ships in American yards is double that of British yards. Eighty per cent of the cost of a ship is spent for labor, and the wages of American shipyard workers are twice as high as those in Britain and three times as high as those in some other foreign countries. American vessels thus start off with a handicap. The determining factor in operating cost is largely capital charges—roughly 15 per cent per annum. Added to this initial disadvantage are the higher operating costs of American vessels.

Aids To Foreign Shipping

Consider the direct and indirect aids granted by foreign countries to their shipping. England has outstanding loans of nearly \$472,000,000. The MAURETANIA and LUSITANIA were financed and subsidized by the British government. France pays subsidies in the form of mail contracts amounting to approximately \$8,000,000 a year and for half a century has granted navigation bounties. Japan pays \$15,000,000 a year in subsidies, and Italy a like amount. Both countries have loan policies similar to those in effect in the United States and Great Britain. Japan in addition pays a scrapping and building bounty. The German government in 1932 guaranteed shipping loans to the extent of \$18,200,000 and made available a subsidy of \$2,850,000 to cover the scrapping of obsolete vessels.

The merchant marine act of 1928 reaffirmed the declaration of principle in the preamble to the act of 1920, and further provided for a system of mail contracts to carry out the announced policy of the government. One naturally asks what has

been accomplished under this system of governmental aid. Among other things, the operation of 550 vessels in 70 foreign services, from 59 United States ports to nearly 600 world ports. Moreover, 42 new vessels have been built and 40 others reconditioned—resulting in the expenditure of some \$200,000,000, all of which went into the channels of domestic commerce and 80 per cent of which went directly to labor. Our merchant marine has now become a billion dollar industry, giving employment to several hundred thousand men, ashore and afloat, and keeping in this country an annual freight bill of approximately \$200,000,000, distributed throughout all the states of the union—which would otherwise go abroad.

Even greater, according to economists, are the intangible benefits of a vigorous merchant marine policy.

ON behalf of American ship-owners, I think that I may safely bespeak their willingness to treat with foreign owners in the solution of all problems of world transport. We all realize that excessive nationalism is a menace to world peace, and that unrestricted subsidization might easily lead to a species of economic warfare impoverishing to all concerned. We do not want economic warfare, yet the very nature of things makes it imperative that we have a merchant marine of adequate proportions. Abolition of all subsidies would destroy the American merchant marine at the very time when we are getting a foothold in world shipping. We are carrying but 7 per cent of the world's trade. Surely, we cannot, in equity, be accused of seeking a transportation monopoly.

The Author

Ships are the delivery wagons of the sea. The nation which entrusts its goods to foreign bottoms is not unlike the merchant who would employ the delivery wagons of his competitors. It is submitted that the approximate \$20,000,000 per annum spent by the government for these accomplishments is indeed a profitable national investment. Without it, the American flag will disappear from foreign trade.

There has been criticism of the merchant marine act and certain people have ridiculed the whole shipping program by citing amounts paid various lines for the transportation of mail. This is an unfair attack. If congress had been concerned only with the transportation of mail, there would have been no provision for naval approval of new vessels. Mail contracts are awarded not only for carrying mail, but for the maintenance of routes deemed essential for the development of foreign trade. Ships are paid not for the carriage of mail only but for the maintenance of swift, frequent service over approved routes, and in vessels of approved design. The government was concerned with the development of American merchant marine and chose the mail contracts as the most appropriate method for this purpose.

The upbuilding of our mercantile structure has also been accompanied by considerable criticism abroad. England has been particularly persistent in her criticism of our marine policies and has succeeded in having the question of subsidies placed on the agenda for the forthcoming world economic conference. Figured either on a per capita basis or per ton of exports, the United States has less tonnage at sea than any other world power. It might be noted that for the ten year period, Jan. 1, 1922 to Jan. 1, 1932, the United States leads in the percentage of tonnage scrapped, leads in the percentage of idle tonnage and trails both Great Britain and Germany in amount of tonnage launched. Yet, we are accused of dumping tonnage.

Importance Of Freight Earnings

During the past ten years, we have paid out more than \$6,000,000,000 to the vessels of other nations. Our own vessels, meanwhile, kept in this country about half of this amount—a \$3,000,000,000 item that has proved a material aid in preserving a favorable balance of trade. The

Abstract of address on *Overseas Shipping Policies*, by Joseph T. Lykes, president, Lykes Bros. Co. Inc., and chairman, American Steamship Owners' association, before the annual meeting of the chamber of commerce of the United States, at Washington, May 4, 1933.

\$200,000,000 now paid to American vessels is, in effect, an invisible export and is just as important to home industries as would be the sending abroad goods of this value.

Maintenance of our domestic flag also tends to reduce an unfavorable balance of armaments. The United States has lagged in the building of ships permitted under the Washington treaty. We should not underestimate the value of auxiliary tonnage in any contingency that may arise. All of us hope that war will never again visit these shores. Yet, in a chaotic world, it would be folly to ignore the possibility of danger. World shipping is in a deplorable state, American shipping included. We would be derelict in our duty if we failed to take advantage of any opportunity to stabilize conditions both here and abroad.

Other nations who carry practically all of their own trade and two-thirds of ours, have little reason for complaint. If these other nations will raise their standard of living to a point matching ours, American vessels will have no further need of government support. As it is, our ships cannot possibly survive in open competition with low cost vessels.

Perhaps the way out is through international agreement on commercial tonnage, along with an international naval agreement. Our present establishment is an extremely reasonable one, no matter from what angle it is viewed. We have no desire to disrupt world shipping. We must, however, reserve the right to a merchant marine capable of carrying a fair share of our own foreign trade and adequate for purposes of national defense. That is all we ask.

Frederick Lang Dies

At the age of 82, Frederick C. Lang, founder of Tietjen & Lang Dry Dock Corp., Hoboken, N. J., died at his home at Leonin, N. J., May 17. The Tietjen & Lang Dry Dock Corp. was sold several years ago to the Todd Shipyards Corp. and is now one of its plants in New York harbor.

Mr. Lang came to America in his boyhood from Mecklenburg, Germany, and became a naval architect and marine engineer. In 1884 with his brother-in-law, John F. Tietjen, he founded the ship repair and dry dock company bearing their name. He retired from active management in this company in 1916. During the World war he was principal surveyor with the American Bureau of Shipping. He is survived by his wife, his son and two daughters.

Goncalo Velho, Second Class Sloop Completed

ON MARCH 1, 1933 the GONCALO VELHO built and engined by R. & W. Hawthorne Leslie & Co. Ltd., Hebburn-on-Tyne, England, completed a series of exhaustive and entirely successful sea trials and was duly handed over to Capt. Francisco Luiz Rebello, representing the Portuguese government. The vessel is rated as a second class sloop and the dimensions are: length overall 267 feet 7 inches; breadth extreme, 35 feet, 7 inches; depth to upper deck, 17 feet.

The vessel is built with a long fore-castle deck extending over about three quarters of her length. The stem is raked and has been specially designed to allow of protective paravanes being fitted, if required. The vessel has been specially designed for service in the Portuguese colonies.

Quarters for the crew are situated forward and are on the upper deck; this arrangement provides for the maximum amount of natural ventilation and light. The ward room is also situated on the upper deck, while the commander's quarters, and officers' cabins are situated on the lower deck immediately below.

A complete system of mechanical ventilation is provided for all living spaces with Punkah louvres fitted in connection therewith, which provide complete control of the ventilation to each compartment.

Refrigerated stores are fitted and also magazine cooling arrangements. Two separate refrigerating plants are provided for carrying out these duties, both of which are interconnected.

The main armament consists of three 120 millimeter guns, two forward and one aft, one of the forward guns being super-imposed to allow both to have maximum areas of fire. For anti-aircraft duties, two 40 millimeter pom-poms are fitted. A complete

fire control system is installed in connection with the armament.

The vessel is provided with gyro-compass installation, echo sounding gear, and submarine fog signal receiving apparatus.

Geared Turbines, Twin Screws

The main propelling machinery consists of twin screws driven by single reduction geared turbines of the Parsons type, capable of developing 2000 shaft horsepower. Steam is supplied to the turbines by two watertube boilers of the three drum Yarrow type.

The vessel was laid down on Oct. 9, 1931, and launched on Aug. 3, 1932. At the invitation of the Portuguese government Mrs. C. V. Osborne, wife of Rear Admiral C. V. Osborne, C. B., C. M. G., director of naval intelligence division, British admiralty acted as sponsor.

At a function following the acceptance of the vessel, Capt. Francisco Luiz Rebello, said in part:

"At the launch of the GONCALVES ZARCO I made the statement that she

would be the pride of her builders, but now, after seeing the GONCALO VELHO ready for sea, I realize that my prediction is excelled, because I never thought this vessel would ever be so fine as she really is.

"At the same time, it is perhaps no more than what had to be expected, knowing well that the firm of Hawthorn Leslie would, in accordance with their traditions, produce a beautiful vessel and thus maintain their great reputation in the shipbuilding world.

"I have the utmost pleasure in thanking all, from the most humble of your workers to the managing director, for their efforts in producing such a good result, and myself and the other members of the mission will never forget the kindly manner in which you have treated us."

The GONCALO VELHO is the first ship of the Portuguese naval program to be handed over. The same company is also constructing for the Portuguese government a sister vessel—GONCALVES ZARCO, as well as two first class sloops.



Goncalo Velho Twin Screw, Turbine Geared Portuguese Sloop

Value of Tank Experiment in Design

by Co-ordinating Theory and Practice

By G. S. Baker*

AT A WELL attended special meeting of the Society of Naval Architects and Marine Engineers at the Hotel Commodore, New York City, May 9, G. S. Baker, superintendent of the William Froude laboratory, Teddington, England, presented a paper on *Experiment and Practice in Merchant Ship Design, Ancient and Modern*. Due to the fact that copies of the paper were not available before the meeting, the discussion was limited in scope and penetration. This paper will be printed as a part of the transactions of the society for the year 1933. In the meantime, the secretary of the society will welcome written discussions from members.

Mr. Baker's paper is divided into four parts and three appendices. Part 1 deals with theory and experiment in relation to progress. Part 2 deals with modern theories connected with ship propulsion. Part 3 covers modern cargo boat design with particular reference to the hull. Part 4 deals with the design of the screw.

Direct Results By Experiment

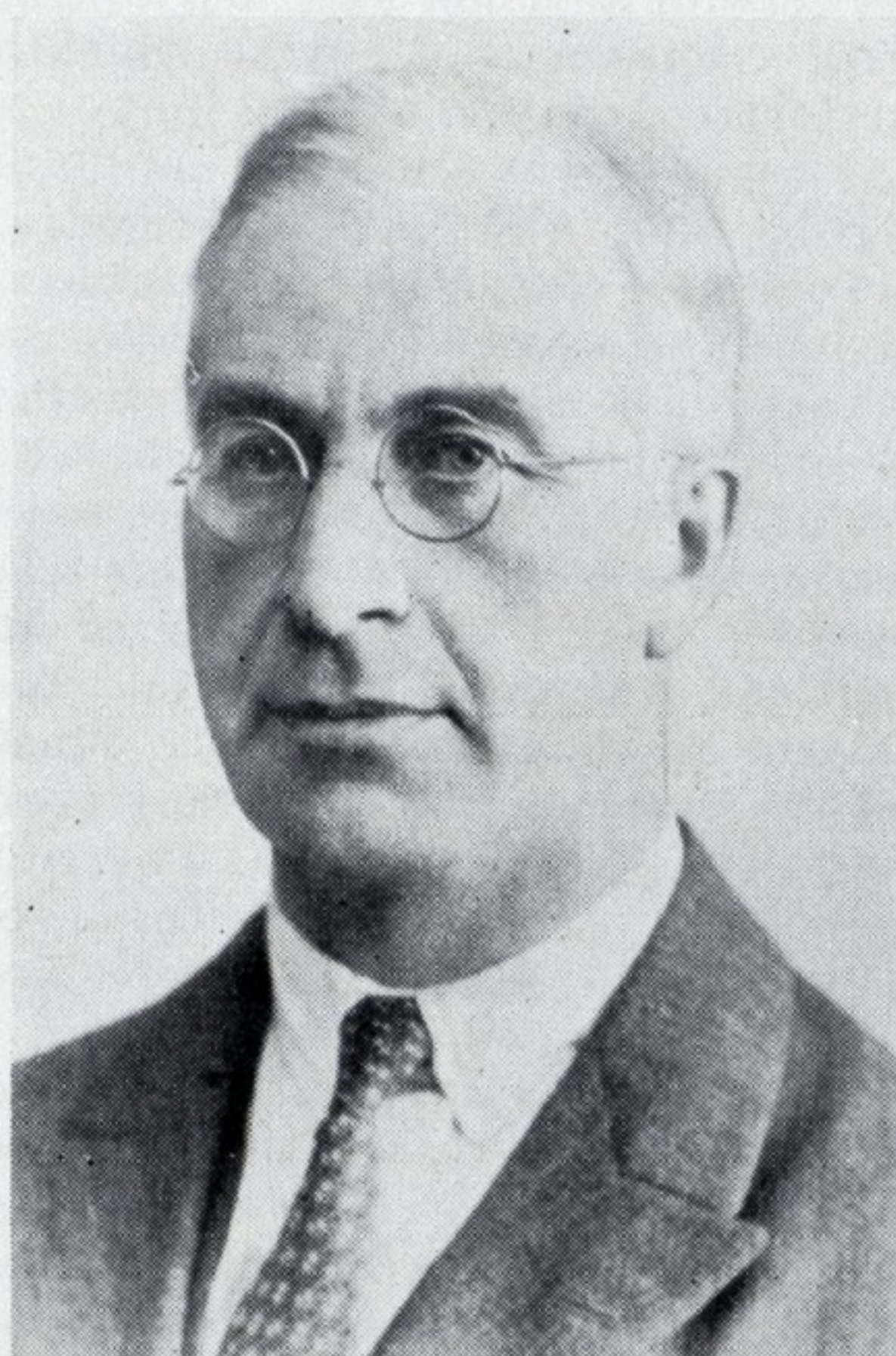
His purpose in the paper, Mr. Baker points out, is to show the value of tank experiments to the shipping industry. Three things are required for progress in any industry—experience, theory and experiment. Until the Middle ages no appreciable progress had been made in the improvement of ship design. It was not until then that a combination of two of these factors occurred. This was when Prince Henry, the navigator, gathered together the pick of the world's seamen at Sargres, Portugal. He sought the experience of others and built new form ships as experiments. Between 1415 and 1460 he made such progress that his ships under Da Gama rounded the Cape of Good Hope and reached India. This was no accident but the result of careful experiment and great experience, so that the event was a repeatable one and Portugal reaped a great harvest.

Prince Henry's vessels were slow. Their average speed was about 2 knots. This remained the average speed of most mercantile vessels for

Abstract of paper on *Experiment and Practice in Merchant Ship Design, Ancient and Modern*, read by G. S. Baker, superintendent, William Froude laboratory, Teddington, England, before a special meeting of the Society of Naval Architects and Marine Engineers, New York, May 9, 1933.

the next 400 years. Toward the end of that period experiments with ship forms began again, by Chevalier de Borda, Romme, Chapman, and Gore, but without success as these men were not good experimenters. In the next 100 years several others followed with little or no progress.

Haphazard experiments going on intermittently in France and Sweden (1811-20) and in England by Colonel Beaufoy in 1793, again failed lacking the combination of the nec-



G. S. Baker

essary factors for success. It is stated that not one of Colonel Beaufoy's forms led to a practical result, and it is stated that the united Swedish and English work during this period cost no less than £50,000.

Experience, Theory, Experiment

Some 50 years later (1867) William Froude commenced towing models on the river Dart, to build up data regarding ship resistance and he found a correct theory on which to base experimental work. Had it not been for such men as Scott-Russell, Edward Reed and William Denny, the work of this form experimenter and more than capable theorist would never have been heard of.

It was this combination of experience, theory and experiment, correctly reached at last, which lead to the first and greatest advance in ship design. He was given an opportunity to try his theory and methods

and proved his case. The world has not yet appreciated what it owes to him. He was followed by his son, R. E. Froude, who, like his father, had a great capacity for research and experiment, as well as a grasp of theoretical matters. He had, however, no practical experience of ships and the development of his work was necessarily in naval ship work where he had the experience of others to guide him. He did very little mercantile ship work.

And here Mr. Baker made a statement which drew the fire of a number of his listeners, in classing the Washington tank with other tanks of that period as being made for naval and not mercantile work. It was pointed out that the Washington tank by the act of congress under which it was built was specifically intended for merchant work as well as naval work. Often, it was said, naval work was put to one side to carry on immediately pressing merchant work.

Between 1884 and 1910, when the Teddington tank was built, there was a steadily increasing appreciation of the value of research. Researches were carried out for the improvement of naval architecture and the assistance of mercantile firms.

What Teddington Tank Does

When Mr. Baker went to Teddington in 1910 he found there was little or nothing known about any type of merchant ship except great masses of disconnected data. With merchant ships the main objective is profit and, therefore, economy. Under economic pressure practically all the recent improvements in ship propulsion have been in connection with merchant ships.

As a justification for the use of an experimental model tank for merchant ships, Mr. Baker presents a list of all the different kind of tests at Teddington, as follows:

1. On the form and efficiency of any ship hull.
2. On the form and efficiency of any ship propeller for single, twin, double-ended, quadruple, etc., hulls.
3. On the steering of ships and maneuvering value of rudders of various types, and the forces and moments on rudders.
4. To determine the correct placing of paddle wheels.
5. To determine the direction of flow near bossings and thence the

correct position and shape of bossings.

6. Similar work to 5 for bilge keels.

7. On the seaworthiness of ships in rough water, i.e., the broad determination of behavior in waves.

8. Shallow-water effects on resistance and steering.

9. The behavior, resistance and attitude of all high-speed craft, flying boats, etc., under various steady conditions.

10. Ship trials are attended and carried out, log and trial data analyzed, for any "tank" ship, and a constant endeavor made to keep contact with the technical officers for whom work is done.

11. The staff will undertake ship work of any character which can be done on a model scale, or partly or wholly by observation on the ship itself.

Over a three year period the percentage of types of vessels tested at the Teddington tank are as follows: fast ocean cargo steamers, 36 per cent; slow ocean cargo steamers, 19 per cent; interimmediate liners, 12 per cent; liners above 17 knots, 6 per cent; coastal steamers, 5.5 per cent; cross channel steamers, 3.0 per cent; ferry steamers, 7.5 per cent; other special types (paddle, yachts, tugs, barges, dredges, etc.), 9.5 per cent. In the one year 1932, 47 models and propellers were tested; 28 designs were prepared; 26 designs were tested with propellers, and trial and log data were analyzed for 8 vessels.

Substantial Saving Shown

A list of 9 examples of tests during the year 1930 shows that the reduction of fuel cost per year for these 9 vessels due to improvement over the original form submitted amounted to £8060, whereas the cost of all these tests was £2515.

Research work has also been of a very broad character. A list is given of 47 papers relative to ship design, which have been published since the inauguration of the tank in 1911. In addition to these, 20 papers have been published giving detailed results with model flying boats and seaplanes, also four papers on full scale work on actual flying boats.

As a result of this research work, rules have been formulated for the calculation of skin friction, wake belt velocities, determining the whole wave-making characteristics of a ship, and the conditions for eddy-making. Through the work of J. L. Kent, Mr. Baker's associate at Teddington, a fairly clear understanding of what features are required for seaworthiness and for speed-keeping has also been reached. The work with screw propellers, both theory and experiment, is now producing most satisfactory results.

In concluding the first part of his lecture, Mr. Baker said that he did not wish to give the impression that the tank can take the place of brains. It can supply knowledge, but not wisdom.

Some Fundamental Theories

The second part of the lecture was devoted to the fundamental theories of ship work, considering these first by themselves to see how these modern developments affect the practice of ship and propeller design. He called attention to the fact that the views presented were his own, and that they may differ from those held by others. As far as possible, experimental data are given to support the views expressed. He first discusses the theories in connection with skin friction and the thickness of the frictional belt, pointing out that for practical ship purposes tests show that this belt thickness for non-divergent stream depends upon only three things: roughness of surface, length and form of hull.

As regards wave-making, the Teddington tank first gave a comparatively simple formula for determining when to expect humps in the resistance of a ship, based upon the use of displacement divided by the area of midship section as the wave making length of the ship. This was presented nearly 20 years ago as an empirical formula based on the analysis of about 200 models. Since then an experimental basis has been developed for this formula. The reasons are giving for believing these results correct, though they are not generally accepted in America.

He then discusses the origin and theories in connection with the screw propeller. No explanatory theory existed until the time of the Froudes. R. E. Froude gave us the actuator or race theory and William Froude the blade strip theory of screw action. These have been accepted for the last 50 years. The first of these broad rules, for many classes of ship, holds as good today as when Froude first started it.

Cargo Boat Hull Design

In part 3 Mr. Baker applies the various theories to obtain good results in ship design. Attention is given to the full form, slow speed, cargo vessel. The type of vessel considered is one doing 10 knots on 400 feet in length. In terms of coal consumed, he points to a number of 428-foot ships of 12,000 tons displacement doing 9.6 knots average at sea on 17 tons of coal (east coast bunkers) per day.

There is no necessity, Mr. Baker said to use patent forms of hull, although some, such as the Maier and the Isherwood arcform are quite good for these conditions. It can be said with almost certainty that if the after end of such ships is drawn to a evade eddy-making automatically

wave-making aft is also eliminated. The length of run required for the former is amply sufficient with a good form for the latter. He then gives a formula for the absolutely necessary length for a reasonable result.

Self-propelled model experiments in smooth and rough water have shown that the propulsive efficiency of a full model (block coefficient, 0.8) was reduced by over 30 per cent immediately rough water was encountered, whereas with a 0.7 block coefficient the propulsive efficiency under the same condition fell only 7 per cent to 10 per cent. These results are borne out by Kent's ship data. According to these data, average winter conditions on the Atlantic will show a loss of speed due to weather of 1.5 knots for a 16 knots trial speed ship; 2.2 knots for 13.5 knots trial speed ship; and 2.8 knots for a 10 knots trial speed ship.

In recent ships designed as a result of the above research, the loss of speed in winter has been reduced on 11-knot cargo boats to about 1.5 knots. The margin of power necessary on occasions to maintain these speeds in moderate rough weather is 7 per cent, 15 per cent and 19 per cent respectively. The average power at sea during the year exceeds the measured mile, power for the sea speed by 15 per cent for the Atlantic to 12 per cent for South Atlantic, and these figures are commonly used in the estimates of power for sea speeds.

Little or no advantage has been found, Mr. Baker said in any forms of this kind by the adoption of bulbous bows, and they are not recommended even for smooth water. When meeting sea any ship with bulbous bow will inevitably throw much water over herself, when in the course of each pitch, the round bulb is just below the wave surface. Speed has to be reduced and a net loss results. In one case of a rounded stem, it was necessary to wear an oil skin when on the forecastle 30 feet or more above the sea level, with an undetectable ground swell.

Design of Efficient Propellers

In Part 4 of the paper, Mr. Baker discusses the design of propellers. There are several sets of propeller data obtained from various series of tests, which are available for general design and estimating purposes. At the national tank, two of these are used, Taylor's recent "average" data for normal single screw work and Froude's data for higher speed screws. Both sets are for circular back screws and from them can be deducted the effect of varying diameter, pitch, etc. There are four main variants—shape of blade section, radial distribution of area, pitch variation within the blade, and rake.

(Continued on Page 40)

Illinois Waterway Is Now Completed

Final Link in Lakes to Gulf System

By W. G. Gude

CEREMONIES this month mark the formal opening of the Illinois waterway, another branch of the huge inland water transportation system that now links many of the principal manufacturing centers of the eastern half of the country. Of primary importance is the fact that the Illinois waterway establishes a connection between Chicago, and consequently all of the Great Lakes, and the Mississippi river and all of its tributaries south to the Gulf of Mexico. Through the Chicago gateway the Great Lakes now are connected for barge navigation with Pittsburgh, New Orleans, Kansas City, Memphis, St. Louis, Minneapolis and St. Paul and intermediate river ports.

The Illinois waterway represents an investment of \$102,500,000, of which sum only \$7,500,000 was furnished by the federal government. The Chicago sanitary district spent \$75,000,000 on the canal built from Chicago to Lockport, Ill., a distance of 30 miles, while the state of Illinois expended \$20,000,000 on the 60-mile section from Lockport to Utica, Ill. Twelve years were required for completion of the latter project. The Chicago river, extending from the sanitary and ship canal, and the lower Illinois river, which the federal government has improved to a 9-foot depth, comprise the other links in the route from Lake Michigan to the Mississippi river.

Opening of the waterway in effect creates a new lake port of the 19 cities, with a combined population of around 230,000, that line the banks from Joliet to Pekin. Bulk commodities, such as grain, coal, cement, sand and gravel are expected to pro-

vide the heaviest traffic over the new artery, similar to the situation on the Ohio waterway, although movement of manufactured goods in large volume also is anticipated. The benefits accruing to the Atlantic and Pacific coast districts from operation of the Panama canal to the disadvantage of the midcontinent region are seen as being somewhat reduced as a result of formation of a direct water route from the lakes to the gulf.

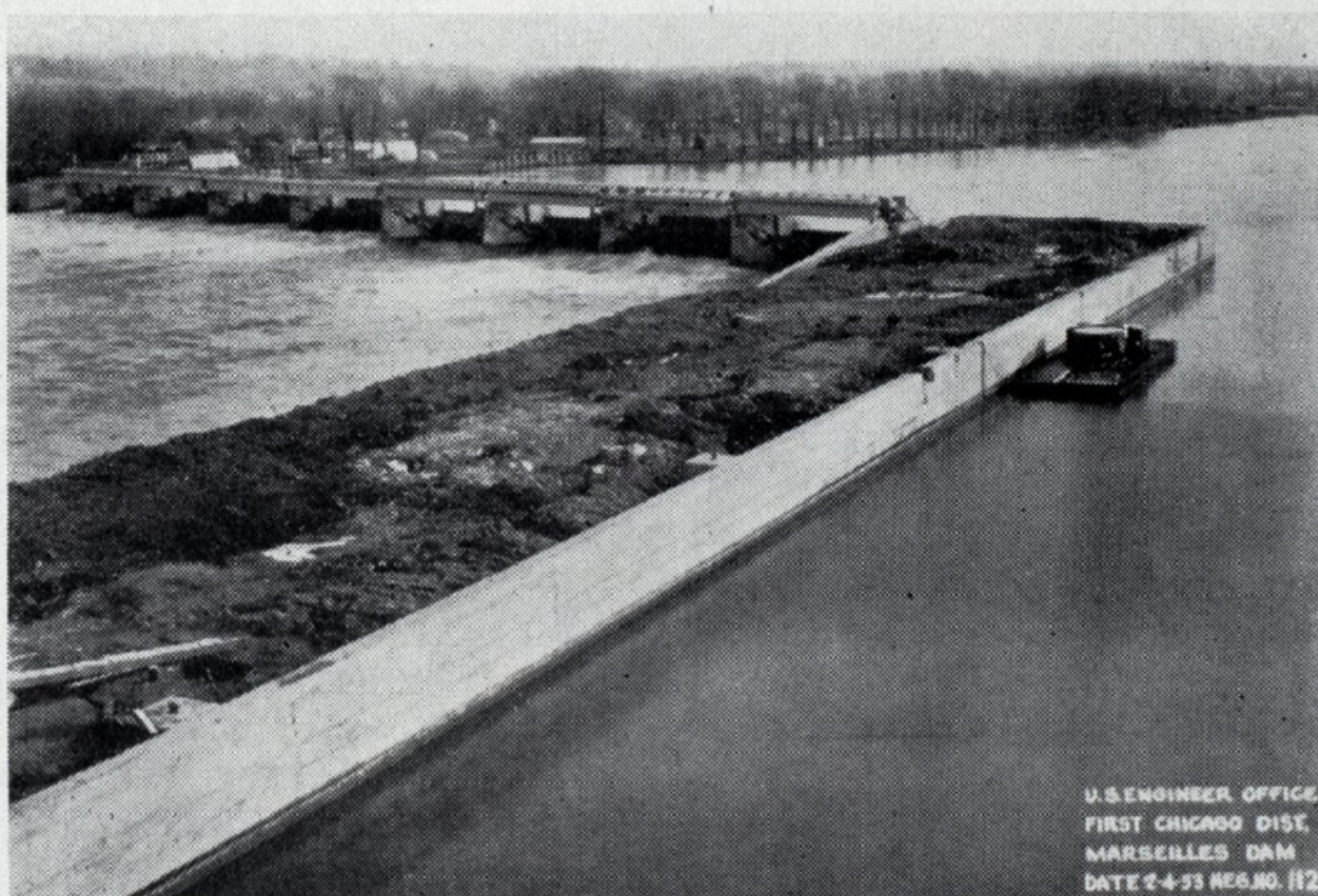
While the Illinois waterway is completed in its essential details, facilities are not yet available for the regular service to southern points that Chicago producers plan.

Limited Movement This Year

Movable bridges over the sanitary canal still must be equipped with machinery to provide more than the present clearance of 16 feet. This means that at the moment only certain types of equipment can navigate the entire route.

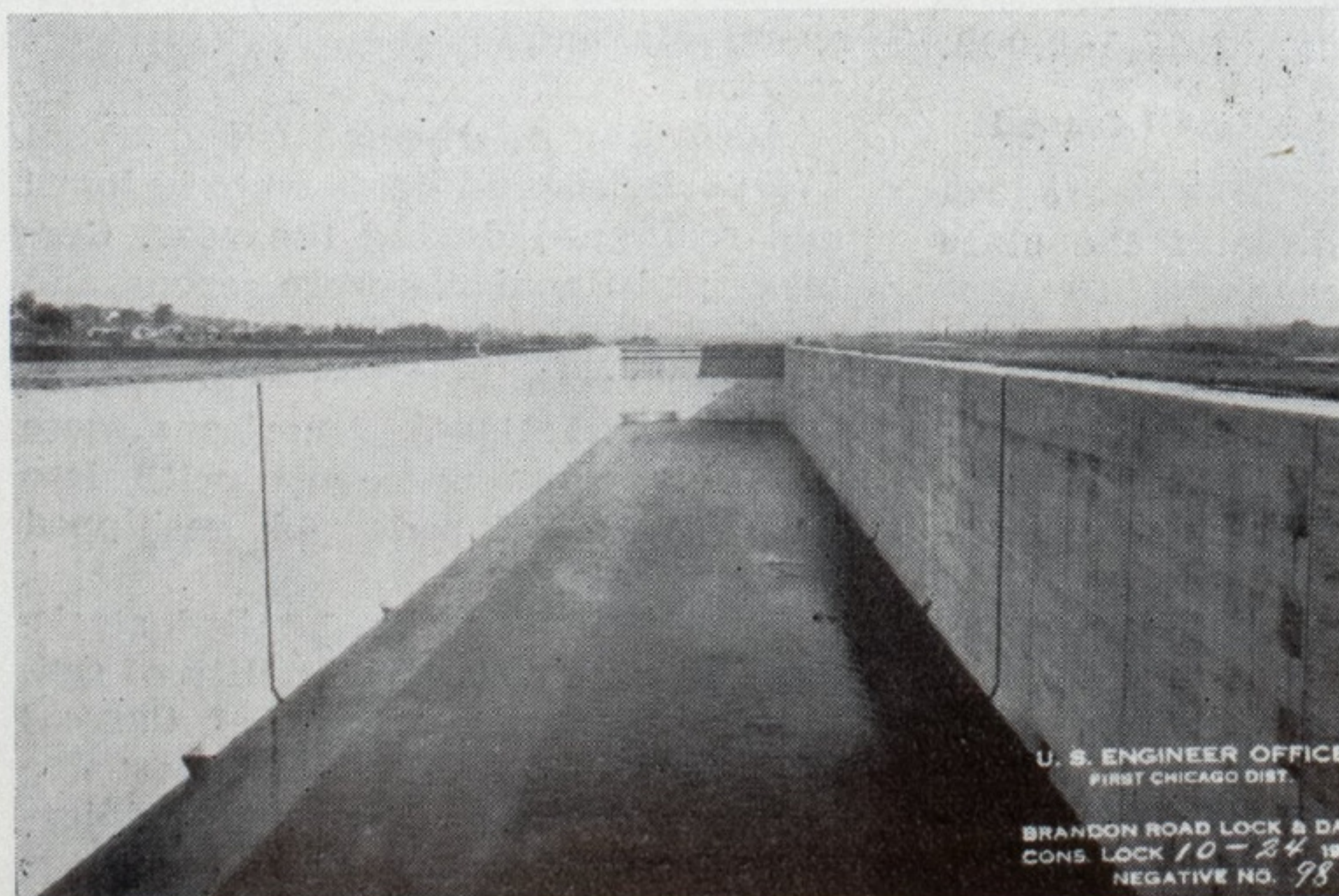
Development of river shipping facilities, including terminals, towboats and barges is following completion of construction work on the waterway. The first tow from St. Louis was sent to Chicago in March, with regular service between the two cities scheduled for thereafter. Creation of several private shipping lines is expected to provide adequate service for connection between the various ports on the Mississippi as well as the Ohio and Missouri rivers. Extension of operations of the Inland Waterways Corp., the federal barge line, to Chicago is expected to begin July 1, following approval by the secretary of war. It will be necessary to break up the tows at Peoria, however, and take them into Chicago by the new type towboat recently developed to provide necessary bridge clearance, due to the 16½ foot clearance on the waterway above Peoria. The larger towboats operated by the federal barge line below Peoria are not able

Illinois Waterway. Marseilles dam, Feb. 4, 1933. Looking northeast. Guide wall and backfill at head of Marseilles canal in foreground. Tainter gates and ice chute at left center



U.S. ENGINEER OFFICE
FIRST CHICAGO DIST.
MARSEILLES DAM
DATE 2-4-33 NEG. NO. 112

Illinois waterway. Brandon Road lock near Joliet, Ill. All locks, 110 feet wide, 600 feet long. Gates electrically operated. Total lift all locks on waterway, 125 feet. Capacity for navigation, 9000 tons per lockage



U. S. ENGINEER OFFICE
FIRST CHICAGO DIST.
BRANDON ROAD LOCK & DAM
CONS. LOCK 10-24-19
NEGATIVE NO. 98

to clear the bridges in the sanitary district canal.

Barge rates have yet to be fixed. The federal barge line does not plan to extend its service as far north as Chicago until July 1, when towboats designed to provide necessary bridge clearance in the sanitary district canal are expected to be ready.

Only a limited movement of steel products from Chicago consequently is anticipated this season, but with the providing of additional facilities and expanding industrial activity a heavy steel traffic is looked for.

So far as Chicago steel producers are concerned, the new waterway in effect will help them to regain markets in the South and Southwest that

have been lost to other districts, particularly Pittsburgh. Chicago lost Pacific coast business to eastern mills when the Panama canal was opened and permitted the latter to ship by rail to the eastern seaboard and by boat westward cheaper than steel could be moved by rail from Chicago to the west. Canalization of the Ohio river gave the Pittsburgh and Wheeling producers a low-cost route to Memphis, New Orleans and the South.

Chicago Mills Regain Position

The all-rail rate on steel products from Chicago to Memphis is 40 cents, including surcharge, and 33½ cents for a combination rail and river route, while the barge rate from Pittsburgh to Memphis is only 20 cents. To New Orleans the all-rail rate from Chicago is 57 cents, or 47½ cents for rail and river, against 25 cents on 500 ton lots by river from Pittsburgh.

This freight rate disadvantage of Chicago, despite the fact that it is 300 miles closer than Pittsburgh to these distributing points, will be offset by the transportation facilities the Illinois waterway provides.

The Illinois waterway is rich in historical background. More than two and a half centuries ago Father Marquette, the explorer, pointed out that water navigation from the present site of Chicago to Florida could be effected by the construction of a canal between Lake Michigan and the Des Plaines river. In 1811 the waterway was reported to congress in a bill with the proposed Erie and other canals. Illinois' northern boundary was shifted northward about 61 miles when she was admitted as a state in 1818 in order that the entire stretch of the proposed waterway might be kept within the confines of one state, and the counties in this 61-mile strip are credited with making possible the election of the Republican state ticket in 1856 and by some with the nomination and election of President Lincoln in 1860.

Canal Of An Earlier Day

In 1836, nearly 100 years ago, the state of Illinois began the building of a canal from Chicago to La Salle, about 97 miles long. The Illinois and Michigan canal, as it is known, was opened in 1848 with the passage of a boat carrying a shipment of sugar from New Orleans to New York. This canal had a 6-foot depth, 36-foot bottom width, 60-foot surface width, and 15 lift locks 105 feet long and 18 feet wide, in addition to a guard lock. The total cost of the canal was \$9,513,021. It was an important factor in the development of the midwest but since has become obsolete to a large degree.

Chicago's sanitary canal, which forms an important part of the new waterway, was built through necessity of preventing sewage from con-

taminating the waters of Lake Michigan and the Chicago river. Attempts to obtain the necessary flow through the Illinois and Michigan canal proved unsuccessful due to the rapid growth of the city. This canal was designed to obtain its water supply by gravity from Lake Michigan but it was built with a summit level 8 feet above lake level and pumping facilities installed to estimate the flow were inadequate.

The sanitary district was established in 1889 and work on the sanitary and ship canal was started three years later. In 1900 water was admitted to the canal and with full operation the flow of the Chicago river was reversed. This 30-mile canal extends from the south branch of the Chicago river, about six miles from Lake Michigan, to the Des Plaines river below Lockport, Ill. It has a depth of 24 feet with a minimum bottom width of 162 feet and a fall of about 5 feet.

With the development of the Calumet district in the southeastern Chicago area, however, a new lake pollution problem developed that was met by the construction in 1911 of the Calumet-Sag channel. This served to reverse the sewage flow from the Calumet river and a portion of the Little Calumet river. The channel, 16 miles long, was completed in 1922 and connects the Little Calumet river, near Blue Island, with the sanitary and ship canal at the sag, about 22 miles southwest of Chicago. It has a depth of 20 feet, a width of 60 feet in the rock section and a width of 116 feet at the water surface in the earth section.

Recommendations for the construction of the Illinois waterway failing to be productive of federal aid, the state adopted a \$20,000,000 bond issue in 1908 when the sanitary district sought to extend its channel through Lake Joliet. Work on the Lockport-Utica section was begun in 1921 following some delay in selection of plans and obtaining of approval by the federal war department. State funds for this work became exhausted in 1931 when about 75 per cent completed due to additional expense in building of bridges, and the government completed the construction at a cost of \$7,500,000.

Locks Are Electrically Operated

Five major structures were required in the building of the state waterway. All locks are 110 feet wide and 600 feet long with electrically operated gates having a minimum depth of 15 feet over the miter sills and a total lift of the combined locks of 126 feet. The maximum capacity of the locks for navigation is 9000 tons per lockage, 300,000 tons per day or 9,000,000 tons per month. The five locks are located at Lockport, 36 miles from Lake Michigan; Brandon road, 2 miles below Joliet; Dresden island, 16 miles below Joliet;

Marseilles; and Starved Rock, located between Ottawa and Utica, Ill. Excavation work involved 4,000,000 cubic yards, while 750,000 cubic yards of concrete and 10,000 tons of iron and steel were required in building the locks and dams. At Marseilles it was necessary to dig a canal because of the rapids on the Illinois river there and the power development in that city. The canal, extending around the rapids, is 2½ miles long.

Estimates as to the probable commerce that will be carried on the Illinois waterway are difficult to make. In a report of the chief of engineers, United States army, made in 1930 it was stated that the probable traffic for a 9-foot project depth was estimated in 1926 at 7,500,000 tons annually and that it was believed this figure to be applicable to the situation in 1930. Development of such a tonnage would justify the expenditure for the completion of the waterway several fold.

Number of Alien Seamen on American Vessels

Of the seamen below the grade of licensed officer employed on American merchant vessels about 32 out of every 100 are aliens according to statistics prepared by the commerce department's bureau of navigation and steamboat inspection for the May issue of *Current Shipping Data*.

The statistics show that 127,500 native born American seamen were shipped and reshipped by shipping commissioners and collectors and deputy collector of customs on American merchant vessels during the year ended June 30, 1932. In the same period, 34,000 fully naturalized citizens and 76,500 aliens were shipped and reshipped.

Assistant Director A. J. Tyrer of the bureau, pointed out that these figures do not indicate the number of seamen employed during the year as they include the shipment of the same seamen. But he said, however, that the figures gave a clear indication of the percentage of aliens, naturalized citizens and native Americans, respectively, employed in the merchant marine.

According to the statistics, about 17,000 British subjects were shipped and reshipped during the year. Germans and Spaniards were second and third with about 1100 seamen shipped and reshipped. Filipinos, Norwegians and South Americans were the next most numerous with less than 8000 shipped and reshipped during the year.

In addition to the detailed statistics indicating the nationality of seamen, the monthly issues of *Current Shipping Data* contain the most important features of several publications formerly published.

Historic Voyage of the S.S. Savannah

Commemorated on Maritime Day

TO HONOR America's ships of peace and those who man them, May 22 has been appropriately set aside for nation-wide observance as maritime day. No day could more fittingly be chosen for this purpose as it marks the anniversary of the sailing from Savannah, Ga., of the American vessel SAVANNAH, first steamer to cross the Atlantic. This epochal voyage began on May 22, 1819 and the SAVANNAH triumphantly entered the river Mersey under steam, on June 20 at 5 p.m., 29 days and 11 hours out of Savannah, during which time the engine had been operated a total of 80 hours.

The English press paid universal tribute to this American achievement. Said Marwade's *English Commercial Report*. "We were gratified and astonished by the novel sight of a fine steamship which came in without the assistance of a single sheet, in a style which displayed the power and advantage of the application of steam to vessels of the largest size. Her model is beautiful and the accommodations for passengers elegant and complete. She is the first ship of this construction that has undertaken a voyage across the Atlantic." Lloyd's list reports the arrival of the SAVANNAH, and in Gore's *Annals of Liverpool*, the arrival is recorded among, "remarkable events." All paid tribute to the SAVANNAH's accomplishments, and all acclaimed her as the first transoceanic steamer.

SAVANNAH. First steamer to cross the Atlantic. A wooden, carvel-built keel ship. Bow strongly convex and full above water, finer below. Raked curved stem; large full head; moderately rising round floor; easy bilge; long well shaped run; straight, nearly vertical stern-post; round stern; medium sheer. Paddle wheels attached to jointed shaft so that they could be turned inboard

Principal Characteristics

Name	Savannah
Owner.....	Scarborough & Isaacs, Savannah, Ga.
Builder, Francis Fickett, Corlear's Hook, N. Y.	
Launched	Aug. 22, 1818
Trial Run	March, 1819
Sailed from New York to Savan..	Mar. 28, 1819
Sailed from Savannah transa..	May 22, 1819
Length overall, feet.....	120
Length on l. w. l., feet	116
Beam extreme, feet	29
Depth of hold, feet, inches	13-6
Tonnage, tons (old measurement).....	350
Rig	Full rigged ship
Propelling engine.....	One inclined, direct acting, low pressure, 90 horsepower; cylinder diameter, 40 inches; stroke, 5 feet; built by Stephen Vail at Speedwell Iron Works, near Morristown, N. J.
Boilers.....	Built by Daniel Dod, Elizabeth, N. J.
Propulsion.....	Side paddle wheels arranged to stow inboard when not in use
Speed, knots, about.....	9 to 10
Cost complete	\$50,000
Master	Capt. Moses Rogers
Navigator.....	Capt. Stevens Rogers

The American minister at London, officially recognized the SAVANNAH's arrival in a letter to John Quincy Adams, then secretary of state. He wrote, "On the twentieth of last month, there arrived in Liverpool the steamer SAVANNAH, the first vessel of this description that has ever crossed the seas. She excited admiration and astonishment as she entered port under the power of her steam. She is a fine ship, and exhibits in her construction no less than in her navigation across the Atlantic a signal triumph of American enterprise and skill upon the ocean."

The SAVANNAH remained at Liverpool for 25 days, during which time

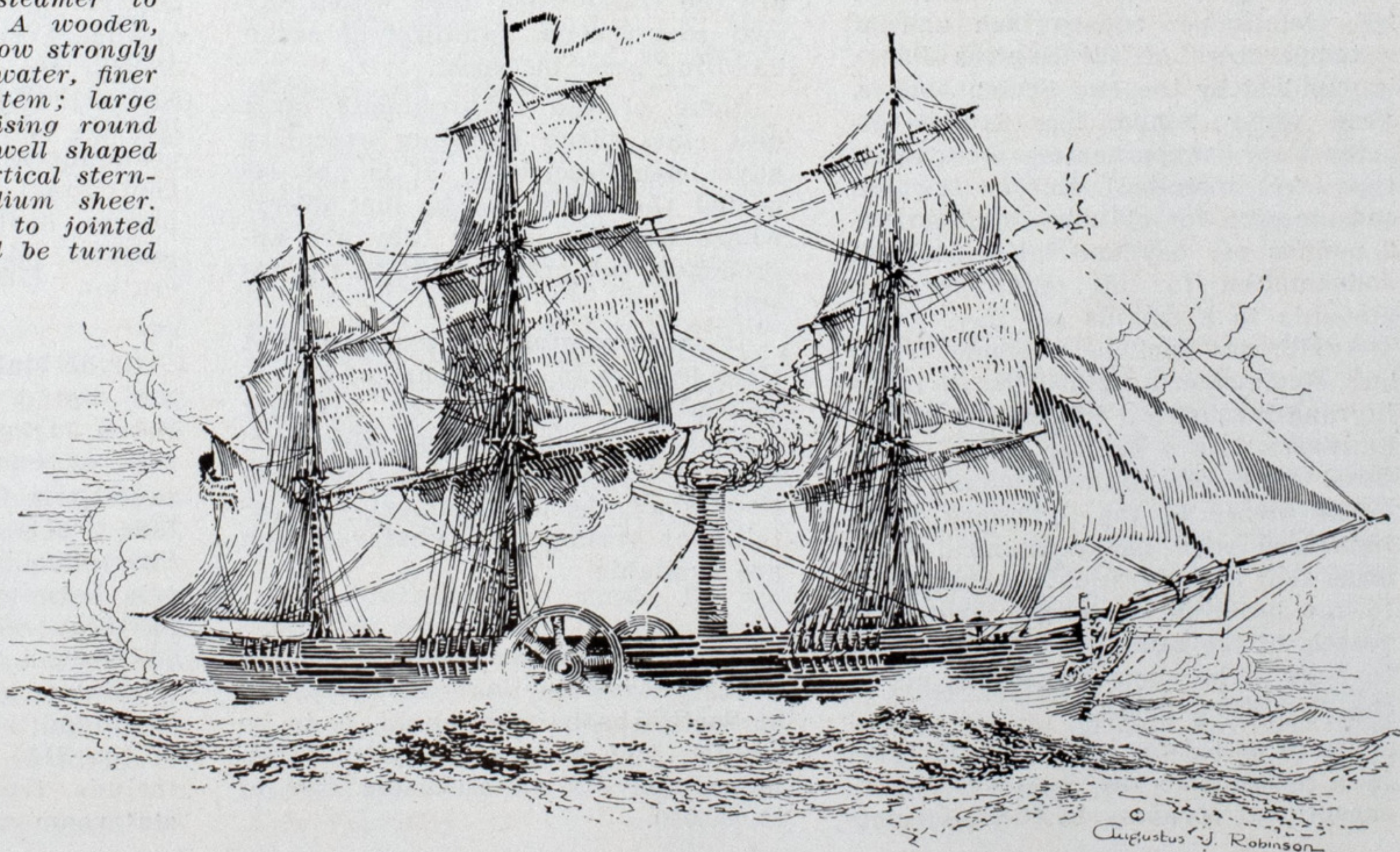
she was visited by government officials and many other persons of prominence. On July 23 she got under way with a full head of steam. After a pleasant voyage to the Baltic she arrived Elsinore on Aug. 9 and five days later sailed for Stockholm. In this port she made an excursion into nearby waters with the Swedish royal family, Mr. Hughes, the American minister, and a large party of nobles and foreign ministers on board. On Sept. 5 the SAVANNAH left Stockholm bound for St. Petersburg, with Lord Lyndock, an Englishman as passenger. She arrived in Cronstadt on Sept. 9 and at St. Petersburg on Sept. 13. On three days, Sept. 18, 21 and 22 she was maneuvered under steam in the harbor of St. Petersburg, having on board members of the royal family, Russian nobles, officers and foreign ministers.

On Sept. 29, the SAVANNAH sailed from St. Petersburg for Cronstadt and on Oct. 10 she, "got under way with steam, past the guard ship laying off Cronstadt, then took in the wheels and set sail in company with about 80 sail of shipping."

Returns Home in Triumph

The voyage from St. Petersburg to Savannah seems to have been unmarked by any event of importance. On Oct. 17 she touched at Copenhagen and on the twenty-second entered the harbor of Arendale, Norway and began her homeward passage which was a stormy one. The engine

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Economical Cargo Ship Sets Low Operating Cost

Since actual service is the best measure of true economy, the following performance of the steamship SCHURBEK built in Flensburg, Germany, 1930, will be of interest.

This vessel was built for general freighting service and has proved to be entirely satisfactory. She is now under charter for a number of voyages in carrying sugar from Cuba to various North Atlantic ports. She recently arrived in New York from Santiago, Cuba, averaging about 11.3 knots on the voyage and carrying 4,320 tons of cargo, on a consumption of 14 tons of coal per day.

The SCHURBEK is a steel vessel of 322 feet, 2 inches in length overall, 45 feet, 3 inches in beam and 21 feet 9 inches in molded depth. Her gross tonnage is 2446.4 and her deadweight tonnage is 4300. She has a grain capacity of 254,000 cubic feet. Her depth of hold is 19 feet 8 inches and height of 'tween decks is 7 feet 6 inches. She has five cargo hatches and capacity for 794 tons of water ballast.

The unique feature of the SCHURBEK is her main propelling plant which makes possible the low fuel consumption, mentioned above, of 14 tons of coal per day. The main engine is a standard Lentz, steam reciprocating engine, having two high pressure cylinders of 18.3 inches diameter and two low pressure cylinders of 39.4 inches diameter. The stroke is 39.4 inches and the revolutions per minute are 75. Indicated horsepower at 32 per cent cutoff is 1225. If the cutoff is advanced to 38 per cent, the indicated horsepower will be 1800. The coal consumption in full loaded condition and at between 10½ and 11 knots is 1.07 pounds of coal per indicated horsepower per hour.

Steam at a working pressure of 200 pounds per square inch and at a temperature of 620 degrees Fahr., is supplied by the two Scotch boilers. Feed water temperature is 265 degrees Fahr. Superheaters of Schmidt type are installed. Lubricating oil consumption for cylinders amounts to 2 pounds per day and lubricating oil consumption for all other purposes amounts to 8 pounds per day.

Auxiliaries include a steam windlass, steam steering gear, electric lighting and mechanical lubrication. The SCHURBEK has a cruiser stern and is fitted with streamline rudder.

The owner of the SCHURBEK is so impressed with her economical operation that consideration is being given to the building of several additional vessels of the same type but of larger tonnage. The same owner has six of the SCHURBEK class.

There are two important features in a vessel like the SCHURBEK; first, exceptional economy in fuel consump-

tion, and second, reserve power readily made available by adjustment of the cutoff. A definite saving in fuel consumption is possible in converting the ordinary reciprocating steam engine by installing a Lentz high pressure cylinder and valve gear in place of the existing cylinder. By doing so, it is possible to develop an indicated horsepower on approximately 1.25 pounds of average quality coal per hour including engine room power auxiliaries. The reliability and economy of the Lentz principle is thoroughly established and with the possibility of rising prices for fuel the desirability of reducing fuel consumption becomes more urgent.

H. H. Moss Is Honored

At the annual meeting of the American Welding Society held at the Hotel Governor Clinton, New York, April 27 and 28, the Samuel Wylie Miller medal was awarded to H. H. Moss, New York "for his achievement in the application of fusion welding and oxy-acetylene flame cutting." The Samuel Wylie Miller medal is an annual award of the American Welding Society and is presented for meritorious contributions to the science and art of welding. It was established in 1927 by the late Samuel Wylie Miller, himself an outstanding figure in the development of welding since its inception.

Cargo Handling Principles

There is nothing impractical about principles. The idea of their impracticability probably arises because of the attempted application of these principles by improperly trained men. One cannot dispute the practicability of cargo handling principles without ignoring established facts. Principles are the frame-work upon which any real constructive handling of cargo handling must be based.

Some of the requirements of a first class cargo handling executive have been described. It is not expected that they can be met everywhere but the nearer they are approached, the greater will be the result.

It is impossible to plan on first class leaders in every part of an organization, because they are not available in such number. However, the history of industrial organizations show the practical value of intelligent training of whatever men are available.

The S. S. PRESIDENT MADISON of the Dollar Steamship line which capsized in Seattle harbor, March 24, is to be rebuilt. The work will be undertaken immediately at an estimated cost of \$1,000,000.

Canadian Pacific Steamships Show Improved Results

In his annual report on the operations of Canadian Pacific steamships E. W. Beatty, chairman and president of the Canadian Pacific railway, stated that the showing for the year 1932 was somewhat better than during 1931. This better showing was due to a careful reduction in expense and to the success of short sea cruises from the United Kingdom. No less than 25,221 persons sailed on these short sea cruises on Canadian Pacific steamships during 1932.

In speaking of the operations on the Pacific, Mr. Beatty referred to, "acute competition from ships which had been built with financial aid from governments and which could not continue in successful operation were it not for large mail subsidies provided by benevolent taxpayers." It is evident that Mr. Beatty's remarks are directed mainly against American operations on the Pacific.

With reference to the character and condition of the vessels of his company Mr. Beatty made this significant statement: "The Canadian Pacific fleet is one of the best balanced in the world, and the innovations in methods of propulsion have been in advance of the engineering practices adopted by any other lines up to the time the ships were built. The EMPRESS OF BRITAIN and EMPRESS OF JAPAN to cite the two outstanding examples, are today in relation to results achieved, the most economically operated vessels afloat. The results in savings in fuel consumption and repairs have surpassed our hopes. Experiments are under way which promise to cut still further the cost of propulsion. I am glad to say that during the period under review there was no major accident to any company vessel."

The Foster Wheeler Corp., 165 Broadway, New York, recently issued a new general catalog covering marine equipment and superheaters, economizers, airheaters, condensers, centrifugal pumps, steam jet air pumps, heaters and evaporators, expansion joints and vacuum refrigeration.

Clyde Mallory lines announce new low round trip summer fares between Jacksonville and New York of \$40. as compared with the winter round trip fare of \$58. A round trip fare between Jacksonville and Charleston is now \$12. The round trip between New York and Miami has been reduced for the summer to \$55 instead of the \$75 round trip fare in winter; and the New York-Galveston round trip fare will be \$94 instead of the \$110 winter rate. These fares include transportation, meals, and stateroom accommodations.

Rate Regulation Is Wanted For Domestic Shipping

At the twenty-first annual meeting of the United States chamber of commerce, held in Washington on May 4, Franklin D. Mooney, head of the Atlantic, Gulf and West Indies lines, in an address on coastwise and intercoastal shipping emphasized the fact that while the operators in these services are not yet of the one mind they are coming to see that shippers as well as operators will benefit from some sort of a government port-to-port rate control.

Mr. Mooney, a member of the United States chamber of commerce committee on competing forms of transportation, said that the committee recommends that common carriers by water in domestic commerce be required to file and adhere to rates including port-to-port rates. Also, that such rates or modification of rates should be subject to approval by a regulatory body.

By the Copeland act, congress in the last session did regulate in this manner all intercoastal shipping. However, this act does not apply to other than intercoastal shipping, nor does it apply to minimum as well as maximum rates. In the opinion of Mr. Mooney and other members of the committee coastwise shipping should be subject to the same regulation and these regulations should include public control of the actual level of the rates.

Hudson River Day Line

The Hudson River Day line resumed its New York-Albany service on May 26. This year the line will offer a series of additional trips over and above the customary schedule for previous seasons, and at considerably lower fares.

The first regular boat left New York for Albany at 9:20 a.m. May 26. The southbound trip from Albany to New York was resumed the following day. Regular sailings will be maintained until the end of the season about the middle of October.

Propeller Club Meets

The annual banquet, meeting and entertainment of the Propeller club of the Port of New York, was held Friday evening May 19, at the Downtown Athletic club, New York city.

The principal speaker of the evening was the Rev. Edmond A. Walsh, Ph. D. regent of the school of foreign service, Georgetown, university, Washington, D. C. The subject of his address was the American merchant marine at the world economic conference, and the need of holding to our established policy for defense, trade and transportation.

Dr. Walsh is an international ex-

pert on the problems of commerce and shipping, and has been consulted by our own and foreign governments. He is a scholar who has concentrated his intellectual powers on the questions and issues arising out of international trade.

An address was also made by Capt. David W. Todd, United States navy (retired), recently appointed one of the three shipping board commissioners.

New Baltimore Service

With the arrival at Baltimore of the steamer BLACK HAWK from Antwerp on April 17, this port became the terminus of improved transatlantic freight and passenger service operated by the Black Diamond lines. The combination passenger and freight vessels BLACK HAWK and BLACK TERN have been assigned to the run, replacing the freighters WYTHEVILLE and WEST ARROW, previously operated.

Westbound time in transit to Baltimore will be improved. Sailing from Antwerp direct to this port, at approximately 18 day intervals, the new vessels will cover the distance between the Belgian port and Baltimore in 10 days, cutting in half the previous transit time. Calls will be made at Norfolk, Philadelphia and Boston after leaving Baltimore on the eastbound voyage. The passenger service is an entirely new feature.

Built originally for the shipping board, the BLACK HAWK and the BLACK TERN were recently reconditioned and accommodations for 12 passengers installed. They are 390 feet long with a 54-foot beam, and are rated as 14-knot vessels.

Pump Company Offices

The new office building of the Worthington Pump & Machinery Corp. located near its plant at Harrison, N. J., was opened on May 1. General and executive offices formerly at 2 Park avenue, New York, have been moved to the new location, though the local sales office continues at 2 Park avenue.

Announcement has been made of the consolidation of the manufacture and sale of meters of the Worthington Pump & Machinery Corp. and Gamon Meter Co. The newly organized company is known as the Worthington-Gamon Meter Co. Sales headquarters for the new company have been established at Harrison N. J.

Announcement is made by the Clark Trutractor Co. Battle Creek, Mich., manufacturer of gaspowered, industrial tractors and lift trucks, of the appointment of Harold B. Madison as branch manager in charge of eastern interests at 467 Canal street, New York city.

Foreign Traders Endorse U. S. Merchant Marine

Following the twentieth national foreign trade convention, held in Pittsburgh, April 26, 27, 28, the council issued a declaration on foreign trade policy subscribed to by more than 600 of the principal firms in the United States engaged in foreign trade. The declaration is the most elaborate issued by foreign traders within recent years. Its statements, particularly on the tariff, will strengthen the hands of the administration in negotiation with other nations for commercial agreements that shall have sound reciprocal advantages.

Concerning shipping, the declaration is clear and unequivocal in its stand for an adequate American merchant marine. The declaration states:

"The convention observes with satisfaction the gradual elimination of governmental competition with privately owned American steamship lines operating efficiently in overseas and intercoastal services. This elimination should be made complete.

"We strongly endorse the support of our government, through the Jones-White act of 1928, of our privately owned merchant marine through such mail subventions and other means as may be necessary to maintain its service to American commerce and the building of such additional new ships as may be necessary to accomplish the primary purpose of the act.

"Provision should be made to extend to cargo ships, when necessary, adequate aid to equalize higher American construction and operating cost. It is essential that the American merchant fleet should be fully developed and that shipyards be maintained capable of building and meeting new needs in design and construction. New construction under government aid should not be sponsored without due regard to surplus tonnage now existing and only where the government's financial interest is adequately protected."

United States shipping board on May 19 requested members of the Transatlantic passenger conference to attend a meeting of the board in Washington May 22 for the purpose of considering the promulgation by the board of rules and regulations pursuant to section 19 of the merchant marine act of 1920.

How wrought iron is made is answered in a booklet entitled "*The New Story of Ancient Wrought Iron*" recently issued by A. M. Byers Co. Pittsburgh.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review

By Harry Bowne Skillman

Attorney at Law

PURPOSE of the Limited Liability act of congress is to promote shipping or maritime commerce by limiting the liability, under certain conditions, of the owners of vessels who engage in it. The conditions are (1) that there must be an act, matter, or thing, loss, damage, or forfeiture, done, occasioned, or incurred for which the owner of the vessel is liable to respond; (2) the act or thing which resulted in such damage must have occurred without the privity or knowledge of the owner. The statute does not protect the vessel against liability for his direct acts or omissions, but only against acts and omissions of others which occurred without his knowledge, and for which he is liable. The liability which the statute limits is an imputed one, and the imputation is raised because of his ownership and the relationship which exists between himself and those in charge of the vessel. The seller of a boat who retains bare legal title as security for the payment of the purchase price is not the "owner" within the statute.—*American Car & Foundry Co. v. Brassert*, 61 F. (2d) 163.

* * *

WHILE the law is that, although the statute does not specifically require the keeping of a lookout, no duty is more universally recognized or stringently enforced, yet it is neither a usual nor, in the case of a tug proceeding on a straight course in broad daylight in a river with plenty of room, a necessary requirement to have a lookout at her stern as well as at her bow.—*Dalzell v. United States*, 60 F. (2d) 1068.

* * *

SUITS against the sovereign, the United States, can be maintained only to the extent that it gives consent thereto, and any statute claimed to give such consent must be strictly construed. With this proposition in mind in the case of *Renew v. United States*, 1 Fed. Supp. 256, it was held that an action by an administratrix for the death of a seaman on a government vessel operated by the Shipping Board Fleet Corp. and lying in the territorial and navigable waters of the United

States, is a proceeding in admiralty within the suits in admiralty act authorizing suit against the United States, and exception to the libel in the instant suit was overruled.

* * *

BURDEN of proving seaworthiness in a limitation of liability proceeding rests upon the owner of the vessel; but if seaworthiness be not established, claimants must still prove causal connection between unseaworthiness and the sinking. If such is shown, then the burden shifts to the owner, seeking limitation of liability, to establish that the unseaworthiness was without its privity or knowledge; in such proceeding presumption of unseaworthiness only arises when the vessel sinks from unknown causes, under such circumstances that nothing but unseaworthiness can explain the accident. The obligation that vessel shall be seaworthy does not contemplate an absolute guaranty that she can withstand all conditions of wind and sea to which it may be reasonably anticipated she may be subjected during such voyages, and with such cargoes as are customarily assigned to her. That is to say, although a presumption of unseaworthiness at the inception of the voyage does arise in the case of a vessel becoming unseaworthy after entering upon the voyage, where there is no apparent cause from stress of weather, collision or negligent navigation, this presumption is rebutted by the existence of one or more of these factors. In other words, perils of the sea from which it is reasonable to assume that a vessel sprang a leak, may overcome the presumption. The privity or knowledge which precludes a corporate owner of a vessel from limiting liability must be that of the owner's managing officials, amounting to actual negligence or omission on their part to maintain the vessel in a seaworthy condition; mere negligence does not necessarily establish existence on the part of the owner of such privity or knowledge.—*CARROLL*, 60 F. (2d) 985.

* * *

IN THE case of *POINT BRAVA*, 1 F. Supp. 366, it was held that the fact that after it was found that rivets were leaking, and repairs were made,

a hydrostatic test was not adopted, was evidence of lack of diligence by the carrier to make the vessel seaworthy. This lack of diligence, when considered in connection with the undisputed fact that the vessel did leak and the cargo was damaged, said the court, "is sufficient to raise a presumption that the vessel was not seaworthy at the commencement of the voyage." And the carrier's duty was not shifted by an agreement of the parties that the shipper should employ a surveyor whose certificate of fitness should be conclusive evidence thereof; the duty of the carrier is to use due diligence regardless, and this duty is nondelegable.

* * *

THE ordinary measure of damages for cargo damage is the market value of the goods at the place of destination. One reason for this rule is that the consignee may replace the goods in the open market, at a fair price, and that the cost of so doing should be borne by him who has breached his contract to make a good delivery. It is not necessary, however, that the consignee actually replace the goods. He may choose not to do so for a variety of reasons, and the wrongdoer is in no position to require such action. Replacement is a theory of damages—not a factual requirement; it is applied where goods are designed for use at the place of destination. While sales may furnish evidence of market value, the sums at which they are consummated do not exclude other means of establishing such value—*WAALHAVEN*, 1 F. Supp. 396.

* * *

THE matter of navigation involving choice as between two channels to reach the open sea in winter, with risk of being frozen in, is a question of the exercise of best judgment by an experienced mariner, and a change of course because of the presence of ice constituted an emergency calling for the exercise of sound judgment and cannot be considered negligence or a "deviation" within the legal definition of that term as a voluntary departure without necessity or any reasonable cause from the regular and usual course of the ship.—*TERNE*, 1 F. Supp. 537.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	232	1,330,774	232	1,311,863
March	243	1,466,812	264	1,536,778
February	237	1,373,856	236	1,380,867
January	254	1,416,857	245	1,383,630
December	244	1,307,332	253	1,387,341
November	227	1,154,961	232	1,175,988
October	253	1,379,283	244	1,328,561
September	258	1,634,448	266	1,658,521
August	287	1,754,583	270	1,636,803
July, 1932	238	1,483,476	254	1,553,215

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	63	193,946	41	131,990
March	60	192,817	43	141,445
February	38	105,262	20	56,395
January	53	154,823	41	142,216
December	44	141,426	37	116,120
November	54	154,796	41	130,250
October	57	167,539	42	115,660
September	45	123,049	36	99,766
August	64	175,530	43	113,901
July, 1932	49	130,439	38	85,956

Boston

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	86	271,864	69	226,862
March	85	259,203	65	240,768
February	83	285,162	53	191,084
January	97	329,575	56	211,428
December	98	300,132	64	241,693
November	88	308,164	59	220,530
October	99	332,754	68	249,150
September	114	337,608	91	283,227
August	117	369,799	103	339,775
July, 1932	121	408,896	101	346,926

Portland, Me.

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
March, 1933	9	24,186	10	23,989
February	19	52,001	19	48,913
January	14	35,038	13	34,153
December	17	43,705	16	40,396
November	7	9,785	6	10,174
October	8	21,407	7	18,228
September	9	14,698	9	16,526
August	14	25,844	14	24,208
July	9	15,156	10	17,733
June, 1932	10	25,895	11	26,519

Providence

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	8	30,156	2	5,650
March	4	17,052	1	4,393
February	7	27,520	1	3,171
January	2	7,473	1	8,820
December	3	7,918	2	11,066
November	4	13,673	3	9,683
October	3	13,133	3	14,471
September	3	11,450	4	5,071
August	5	13,418	1	9,634
July, 1932	2	5,918	2	

Portland, Oreg.

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	17	67,220	24	97,104
March	20	79,537	43	162,970
February	25	97,554	34	130,014
January	24	95,271	33	138,372
December	22	92,267	41	166,858
November	19	78,628	41	157,544
October	25	98,792	45	182,167
September	25	98,370	37	146,945
August	22	93,256	32	127,572
July	21	84,961	24	99,035
June, 1932	20	80,272	25	98,356

Baltimore

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	63	198,940	58	178,957
March	72	228,806	72	223,594
February	63	195,299	75	226,672
January	77	247,903	78	252,052
December	75	238,598	68	224,544
November	80	254,047	83	262,796
October	98	281,907	94	281,534
September	66	190,459	80	241,287
August	88	243,077	87	245,091
July	88	255,354	86	255,209
June, 1932	95	299,502	97	294,264

Norfolk and Newport News

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	14	39,010	36	100,485
March	18	56,097	42	111,038
February	16	49,213	36	82,544
January	20	58,470	33	76,493
December	28	77,286	38	92,621
November	20	54,678	35	79,516
October	15	60,775	36	80,792
September	26	74,483	53	118,437
August	25	53,025	37	86,952
July, 1932	23	72,755	36	91,332

Jacksonville

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	3	8,297	8	20,260
March	7	18,536	9	18,137
February	6	15,126	7	13,454
January	3	4,683	8	21,018
December	10	24,067	10	24,595
November	10	24,352	2	1,799
October	8	16,714	8	13,659
September	7	15,879	7	12,539
August	8	14,142	9	16,647
July, 1932	8	20,558	7	16,963

Key West

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	41	50,121	35	47,458
March	42	57,720	39	54,508
February	37	52,615	34	49,320
January	38	55,322	38	54,692
December	38	59,058	39	58,604
November	37	64,384	37	61,961
October	35	62,394	35	62,394
September	36	60,309	36	61,405
August	37	66,432	37	66,313
July, 1932	38	62,503	40	62,486

Mobile

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	105	209,469	109	235,429
March	96	234,328	91	206,064
February	80	184,669	83	200,850
January	100	232,451	91	201,671
December	86	204,295	92	209,061
November	94	210,195	97	234,590
October	105	228,041	105	233,510
September	89	166,896	96	193,213
August	90	196,453	88	188,375
July, 1932	107	222,810	99	203,444

Seattle

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	133	476,882	143	487,289
March	47	194,485	51	216,803
February	43	196,979	43	190,338
January	50	212,954	49	210,083
December	45	202,731	47	207,521
November	43	193,530	45	200,513
October	53	235,224	58	251,334
September	40	168,740	40	175,635
August	39	183,141	36	167,807
July, 1932	32	145,560	36	162,923

New Orleans

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	142	409,411	154	416,833
March	161	464,728	161	457,880
February	128	378,040	127	366,948
January	135	307,750	145	410,412
December	151	434,935	157	450,545
November	146	442,427	156	457,621
October	140	403,062	150	424,621
September	151	423,791	139	415,704
August	160	448,826	156	442,655
July	166	438,496	171	448,198
June, 1932	170	597,552	164	457,960

Charleston

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
March, 1933	35	99,612	29	83,243
February	24	65,228	24	65,218
January	28	83,545	23	65,063
December	24	58,943	24	63,086
November	33	93,457	30	85,072
October	14	33,693	12	34,625
September	21	54,638	20	52,035
August	15	29,293	18	46,756
July	17	39,628	14	39,844
June, 1932	26	80,438	25	78,864

Galveston

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	27	64,360	73	215,020
March	19	34,677	83	239,683
February	17	29,935	69	200,485
January	23	43,723	79	235,748
December	24	39,491	103	311,999
November	29	64,016	102	314,452
October	26	54,231	94	277,977
September	25	38,083	85	236,532
August	29	44,389	71	202,598
July	27	50,302	79	220,489
June, 1932	29	47,046	81	226,542

Los Angeles

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	178	625,508	190	614,741
March	152	550,205	167	599,191
February	143	528,613	155	543,628
January	162	633,944	169	668,576
December	152	538,392	156	560,901
November	194	645,826	195	662,569
October	209	641,131	201	657,641
September	223	581,402	222	610,443
August	253	653,836	244	635,164
July, 1932	226	646,417	230	617,947

San Francisco

Month	(Exclusive of Domestic)		(Exclusive of Domestic)	
	—Entrances— No. ships	—Clearances— Net tonnage	—Entrances— No. ships	—Clearances— Net tonnage
April, 1933	138	733,163	150	652,593
March	145	667,902	156	693,893
February	145	658,005	144	621,439
January	154	672,230	147	657,934
December	135	608,843	170	579,362
November	154	672,184	152	655,379
October	147	669,637	166	727,969
September	136	608,268	153	667,866
August	152	640,952	162	702,483
July, 1932	148	687,695	142	655,436

Houston

Month	(Exclusive of Domestic)		(Exclusive of
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Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

BIDS have been asked by Gibbs & Cox, Inc., naval architects, New York, for building one or two freight ships of about 9000 tons dead-weight and 400 feet in length intended for the service of A. H. Bull & Co., 115 Broad street, New York.

No information is available as this is written in regard to the amounts bid or when the order will be placed. The proposed new vessels, it is understood, are to be of the plain economical freighter type, suitable for ocean freight service.

Ask Bids for Destroyers

The navy department will open bids July 6 for four destroyers. It is understood the new vessels will be flotilla or destroyer leaders, that is, vessels somewhat more elaborate than the usual destroyer. The law provides that these ships may be built either in government or private yards, but not more than two are to be given to any one yard. At the present time it is believed that the awards will go to private yards. The building of these four vessels is entirely apart from the major naval shipbuilding program which is now being favorably considered in congress.

Leviathan in Lay-up

The shipping board on May 6 approved the request of the United States lines for permission to omit the seven voyages required to be made during 1933 by the steamship LEVIATHAN. In the meantime, the board will require that the United States lines make a corresponding number of additional voyages to Hamburg and London with other of its vessels including the two new ships, S. S. MANHATTAN and the S. S. WASHINGTON.

The LEVIATHAN will be laid up during this period but will be maintained in such condition that she can proceed to sea upon reasonable notice.

Largest Radio Contract

Lykes Bros. Steamship Co. recently placed what is said to be the largest contract ever executed for ship radio service and apparatus. The contract was placed May 6 with the Radiomarine Corp. of America for radio service on the 67 ships of this

and its allied companies. Twenty-five of the vessels will be equipped at once with Radiomarine emergency transmitters and complete, standard equipment is being prepared for seven.

The Radiomarine Corp. has also obtained contracts for complete installations of radio apparatus on the S. S. MALTON of the Osceola Steamship Co., the S. S. NOSA DUKE of the Northland Transportation Co. and for three ships of the American Line Steamship Corp. The United States lines has contracted with the Radiomarine Corp. for radio service for ten of its ships, the S. S. LEVIATHAN among them.

The total number of ships covered by these several new contracts for radio service is 82.

Dry Docking Manhattan

For the first time since the United States liner MANHATTAN entered service last August, time was taken out on her last stay in New York for dry docking, cleaning and painting her hull. She entered the large graving dock at the Robins plant, Brooklyn, N. Y., of the Todd Shipyard Corp. on May 17. Only one day was required for the seasonal bottom cleaning and painting, and she returned to Pier 61, North River, on May 18.

The MANHATTAN sailed from New York on her regular run to Hamburg via Cobh, Plymouth and Havre in command of Commodore A. B. Randall, who had been master of the LEVIATHAN, now withdrawn from the transatlantic run. Capt. Schuyler F. Cummings, who had been in command of the MANHATTAN on her previous voyage, has been transferred to the PRESIDENT HARDING.

Unique Subsidy Proposal

Much has been said about government aids to shipping. The latest tentative proposal is interesting; that the British government contribute to its shipping part or all of the wages of British nationals serving as deck and engineering officers on vessels of the British flag.

It is suggested that this form of aid would not be subject to criticism as discriminatory as it would apply equally to owners of every kind of ship. It would merely make certain that British officers were employed

on British ships. It would also have the tendency of building a personnel strictly British in character and would make for closer relations between officers of British merchant ships and the government.

Work on Naval Ships

Work has been begun on the new \$2,500,000 destroyer MACDONOUGH at the United States navy yard, Boston. It is estimated that it will take about two years to complete the vessel. Her construction will provide work for several hundred men during this period.

The new submarine CUTTLEFISH is under construction at the yard of the Electric Boat Co., New London, Conn. The CUTTLEFISH, it is expected, will be ready for launching some time in August or September. At the present time 650 men are employed as compared with about 400 a year ago.

Orders Maier-form Ship

J. P. McGill & Son, New York agent for the Maier-Shipform Co., Bremen, has announced that an order has been placed for a Maier-form ship by Wilhelmsen, Oslo, with the Odense Shipyard, Denmark. The new vessel, a freighter, with engines developing 8000 horsepower, is to be 470 feet in length, 61 feet beam, and will have a draft of 27.4 feet. She will have a service speed of 16 knots, a gross registered tonnage of 8500 and a displacement of 15,700 tons.

Motors for Normandie

Four enormous motors, each rated at 40,000 horsepower will be installed in the new French liner NORMANDIE, to propel this 75,000-ton liner at a speed of 30 knots. According to engineers of the General Electric Co., these are the most powerful motors ever built. The airplane carriers SARATOGA and LEXINGTON, which have the largest motors of any American vessel, are each equipped with eight motors of 22,500 horsepower each.

By contrast the smallest motor made by the General Electric Co. to operate on a regular 110-volt circuit, is rated at thirty-three hundred-millionths of a horsepower (0.00000033 h.p.). It is used in delicate electric meters.

Senate Investigation of Mail Contracts

The feeling seems quite general among steamship men and others interested in marine affairs that the investigation, now under way by a committee of the United States senate, into the entire question of mail contracts and construction loans will have the effect ultimately of strengthening the government's merchant marine policy.

It is felt that the investigation will show clearly that there can be no possible hope of the development of an American merchant marine without the encouragement and aids offered under the merchant marine act of 1928. In other words the investigation should place the execution of the terms of this act on a fair and efficient basis which will in no way cause hardship to any company who has met its obligations and responsibilities under the mail contracts and construction loan regulations.

Since there are still a considerable number of new vessels and also a program of reconditioning of vessels called for in existing mail contracts, the sooner the investigation is carried out, the better, so that this work can be begun as rapidly as may be feasible.

Launch Steel Towboat

The steel tugboat TURECAMO GIRLS under construction by the Bath Iron Works Corp., Bath, Me., for the Turecamo Towing Co., Brooklyn, N. Y., was launched on May 6. The new vessel was to be delivered before the end of May. Designed by Merritt Demarest, Tottenville, N. Y., the TURECAMO GIRLS was christened by four-year-old Frances Turecamo, daughter of Mr. and Mrs. Bart Turecamo, Brooklyn, N. Y.

The new tug is designed for heavy duty service in New York waters and is 93 feet in length overall, 23 feet in molded beam and 11 feet deep. She is powered with one 6-cylinder, 600-horsepower, Winton diesel engine. A

10-kilowatt electric generator and a 16 cubic-foot two-stage, air compressor is driven by a 20-horsepower Winton diesel engine. The tug is equipped with wrecking, suction hose, fire nozzle and hose connections.

In finish, the new vessel is one of the finest of her type built on the Kennebec. The interior is sheathed with mahogany faced plywood on walls and overhead. The furniture and trim is in keeping with the finish. The wheelhouse opens port and starboard onto a bridge extending the width of the main deck house. Living accommodations for the crew are located in the deck house. Four transverse watertight bulkheads divide the hull into five compartments.

United States Engineers

For repairs to the United States steam towboat PENNOVA, bids on which were opened recently by the United States engineers, Pittsburgh, Dravo Contracting Co., Pittsburgh, was low at \$3229 and the Pittsburgh Coal Co. second at \$5431.

Sealed proposals will be received in the office of the chief of engineers, United States army, Munitions building, Washington, D. C., until 11 a.m., June 7, for 13 sets of radio transmitting and receiving instruments. Specifications for this equipment may be obtained from the office of the chief of engineers and further information will be furnished.

Bids were to be opened on May 17 by the United States district engineer Custom House, St. Louis, for building two steel derrick boats. These vessels are to be 45 feet 9 1/8 inches long overall, with a 20-foot beam of hull, and a depth of 4 feet. The power plant is to be a heavy duty gasoline engine, developing not less than 45 horsepower, at 1000 revolutions per minute.

Italian shipyards and also shipbuilders in other countries it is understood have been asked by the Soviet government to bid on one submarine and four light cruisers.

Liner Monarch of Bermuda To Be Improved

The Furness Bermuda liner, MONARCH OF BERMUDA, which on her entry into service some 18 months ago was hailed as the outstanding luxury liner afloat, is to be temporarily withdrawn from service for about three months in order that she may be still further improved by the addition of the latest and most modern innovations developed since she entered the New York-Bermuda trade in November, 1931.

The MONARCH OF BERMUDA sailed on May 5 for England where she will receive a general overhauling. The work will include among other improvements the installation of a new type of deck swimming pool which has proved so satisfactory in her sister ship QUEEN OF BERMUDA. The next scheduled sailing of the MONARCH OF BERMUDA in the New York-Bermuda run will be in the latter part of July. In the meantime the QUEEN OF BERMUDA which entered service a few weeks ago will maintain the Furness line's service with weekly and occasional twice weekly sailings until the return of the MONARCH OF BERMUDA, after which the two ships will revert to the former schedule of two sailings a week from New York and Bermuda from August on as has been the custom in previous years.

The Furness Bermuda line is demonstrating its progressiveness in thus seeking to improve so recent and so fine a ship. This attitude is undoubtedly one of the principal reasons for the success of the line, and is an example which must be followed by other companies if they are to obtain a share of the patronage of an ever increasingly discriminating public.

Capt. C. M. Armstrong, passenger traffic manager of the Furness Bermuda line, calls attention to the fact that hardly a month passes that there is not a new development of importance. Wishing to give its patrons the utmost in service, the Furness Withy Co. is constantly on the alert to keep pace with all these recent developments in the shipbuilding art.

Bunker Prices

At New York			At Philadelphia			Other Ports	
Coal	Fuel oil	Diesel engine	Coal	Fuel oil	Diesel engine	May 18, 1933	
Alongside	alongside	oil alongside	trim in bunk	alongside	oil alongside		
per ton	per barrel	per gallon	per ton	per barrel	per gallon		
May 18, 1933...4.30@4.60	.80	4.08	May 18, 1933...4.30@4.60	.80	4.04	Boston, coal, per ton..	\$7.38
Apr. 18.....4.30@4.60	.80	4.08	Apr. 18.....4.30@4.60	.80	4.04	Boston, oil, f. a. s. per	
Mar. 18.....4.30@4.60	.80	4.08	Mar. 18.....4.30@4.60	.80	4.04	barrel.....	\$0.75
Feb. 18.....4.30@4.60	.80	4.08	Feb. 18.....4.30@4.60	.80	4.04	Hampton Roads, coal, per	
Jan. 17.....4.50@5.00	.80	4.08	Jan. 17.....4.50@5.00	.80	4.04	ton, f.o.b. piers \$4.25 to \$4.50	
Dec. 16.....4.50@4.75	.80	4.75	Dec. 16.....4.00@4.75	.80	4.04	Cardiff, coal, per ton....	13s 9d
Nov. 18.....4.50@4.75	.80	4.08	Nov. 18.....4.00@4.75	.80	4.04	London, coal, per ton....	s -d
Oct. 18.....4.50@5.00	.80	4.08	Oct. 18.....4.50@5.00	.80	4.04	Antwerp, coal, per ton... 17s	0d
Sept. 18.....4.50@5.00	.80	4.08	Sept. 18.....4.50@5.00	.80	4.04	Antwerp, Fuel oil, per ton67s	6d
Aug. 18.....4.50@5.00	.90	4.08	Aug. 18.....4.50@5.00	.90	4.04	Antwerp, Diesel oil, per	
July 18, 1932...4.50@5.00	.90	4.04 1/2	July 18, 1932...4.50@5.00	.90	4.08	ton.....	82s 6d
						British ports, Fuel oil... 87s	11d
						British ports, Diesel oil.102s	11d

Equipment Used Afloat and Ashore

Stacks on Grace Liners—Bearings—Valve Grinder—Hydraulic Pumps
Dredge Equipment—Cable—Regulator Valve—Gage—Welding Method

ONE of the novel characteristics of the four new Grace liners, SANTA ROSA, SANTA PAULA, SANTA LUCIA and SANTA ELENA, is the shape of the stacks and the ingenious arrangement on the forward stack to overcome the smoke problem on decks, in passageways and passenger quarters.

In these ships the application of modern devices such as economizers and air heaters to increase efficiency, has made the problem of taking care of smoke from the stack still more difficult because of the reduced temperature of the boiler room gases and the consequent slower velocity. The designer had to consider not only how to get these gases off the ship successfully while keeping the stacks low and racy in appearance, but he had also to keep in mind the service of these ships in tropical waters and particularly the fact that they have dining rooms with roll back domes located just below the main stack.

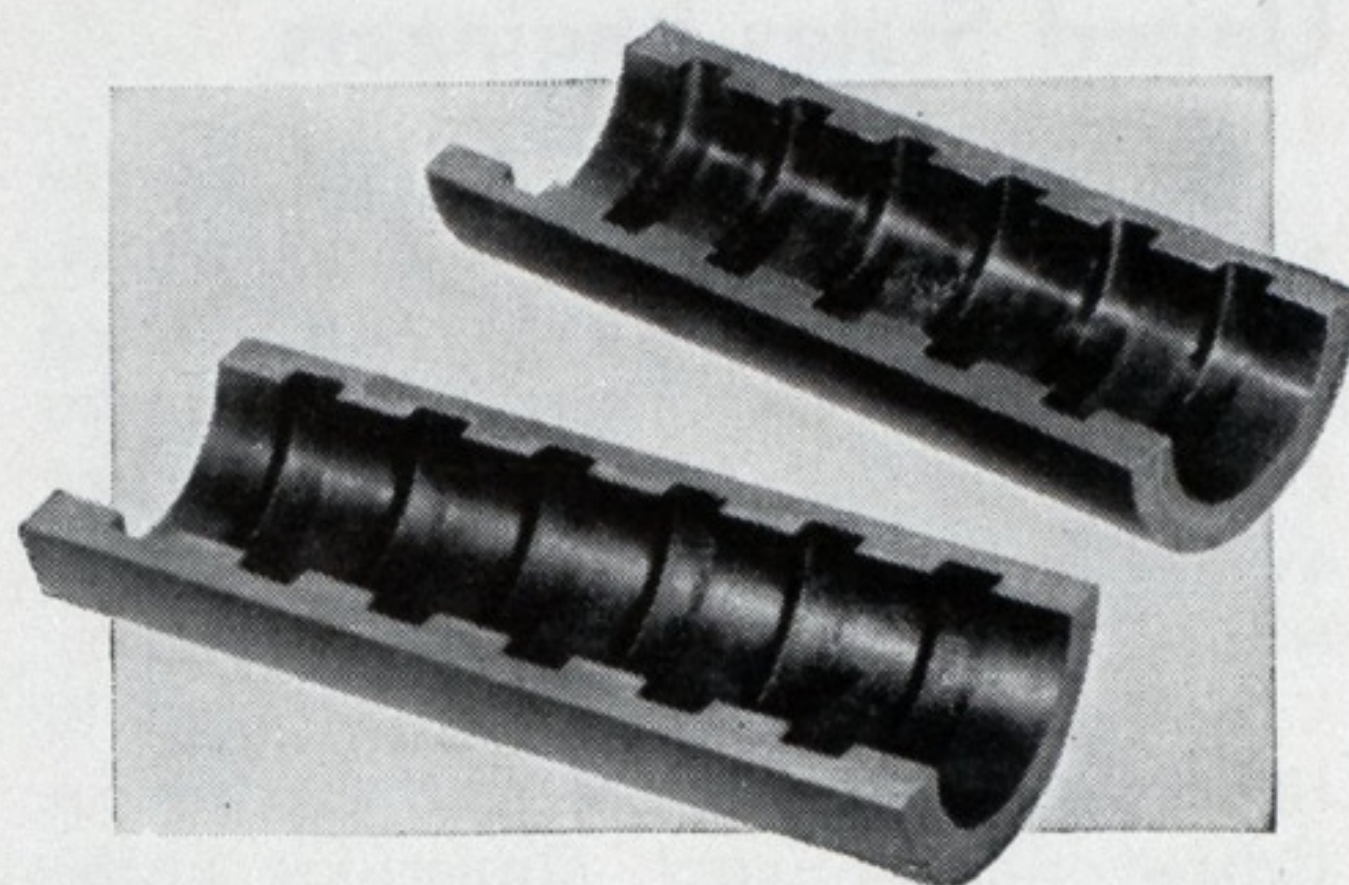
Gibbs & Cox Inc., the New York firm of naval architects, who designed the ships, carried out experiments in the Guggenheim Aeronautical laboratory at New York university. Accurate ship models to scale were suspended in the wind tunnel and in this way wind velocity as well as smoke and gas velocity of the stack were carefully measured.

As a result of these experiments the "tear drop" or "streamline" sectional form of stack was adopted to insure smooth air flow. In the efforts made to smooth the flow over the top of the stack, it was found that a form something like an inverted boat hull with two horizontal wings, resembling the tail of an airplane, not only solved this problem but also had the effect of increasing the draft through the stack. As finally installed this "airplane" smoke stack keeps the ship free of all smoke and gases and virtually increases the height of the stack by 12 to 15 feet.

Non-metallic Bearings

THE Gatke Corp., 228 North LaSalle street, Chicago, has recently made available a complete line of its molded, non-metallic bearings for all services. The general appearance of the bearing is shown in the accompanying illustration. These non-metallic bearings are made of a special textile base impregnated with synthetic resins molded under high pressure and are furnished in all shapes and sizes.

Three basically different materials are used for molding these bearings for various services. The first of these is recommended wherever bearings run in water or where water is available for lubrication. The second is designed for equipment which is oil lubricated; and the third is self-lubricating made for slow moving machinery, where dirt and grit may be



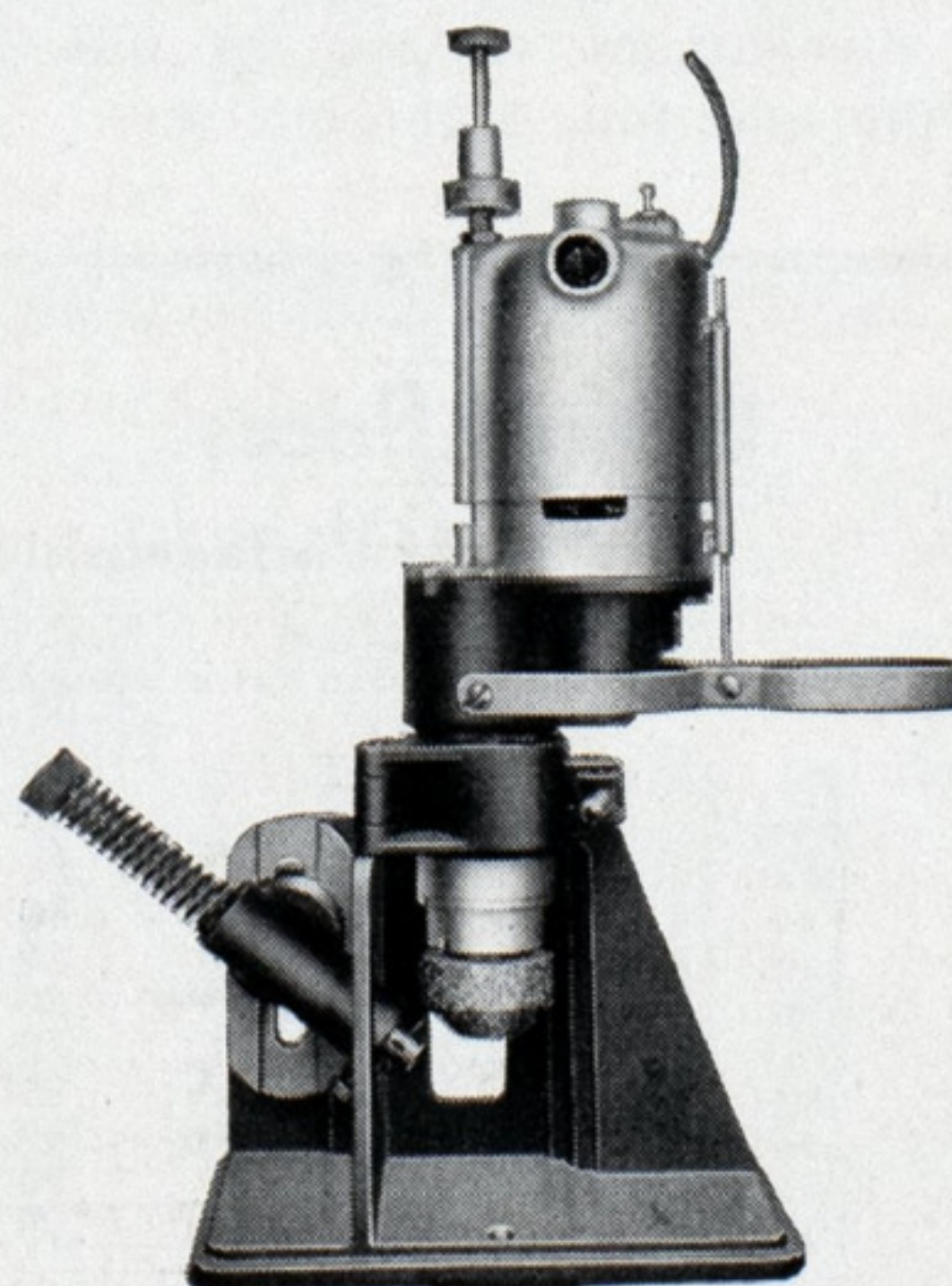
Molded Non-metallic Bearings

encountered or where lubrication is neglected.

These bearings may be used to replace any existing bearing or bushing, and can be molded to dimensions with inserts if required. No machining is necessary. Characteristics do not change with age and deterioration does not occur during layup of machinery or neglect over long periods.

Hard Valve Seat Grinder

THE Hall Mfg. Co., Toledo, O., has recently developed a line of portable grinders embodying the same eccentric principle used in factory production for grinding the hardened



Valve Seat Grinder of New Type

valve seats now rapidly becoming standard practice in marine diesel engines, as well as gasoline engines.

This valve grinding service machine in its diamond dresser stand is shown in the accompanying illustration. It will take care of valve seats up to 2¾ inches in diameter. The grinding wheel on this model rotates at 8500 revolutions per minute while traveling eccentrically around the seat at 30 revolutions per minute. The larger machine, handling valve seats from 2½ to 4½ inches in diameter, is identical except that it is designed for heavier duty and the grinding wheel speed is 5000 revolutions per minute, while the eccentric speed is 17 revolutions per minute.

Either of these models may be used for servicing hardened valve seats within the limits of the diameter noted. For servicing larger diesel engine valve seats up to 8½ inches in diameter, the company has developed a similar grinder embodying the same eccentric principle.

New Hydraulic Pumps

A NEW line of hydraulic pumps and motors of the rotary radial piston type has lately been developed by the Northern Pump Co., Minneapolis, Minn. A complete choice of pumps is now available in sizes from one gallon per minute to 200 gallons per minute and pressures of 4000 pounds per square inch, for pumping oil for hydraulic systems.

The volume of discharge can be changed to deliver any amount from zero to the maximum capacity of the pump and the discharge can be reversed without stopping the pump or changing the speed or rotation.

Among the advantages of this new pump are: sensitive control of speed by regulation of discharge; automatic speed increase; smooth action; reduced maintenance because the hydraulic medium is lubricating oil; reduced power consumption; efficiency increase; freedom from fire hazard; and flexibility of design and application for special purposes.

All of these pumps are fitted throughout with nitralloy said to be the hardest metal known and to permanently resist wear which might otherwise be caused by dirty oil. A balance pressure design is incorporated whereby hydraulic forces are balanced to prevent heavy bearing loads at high pressures.

Electrical Equipment on Pipe Line Dredges

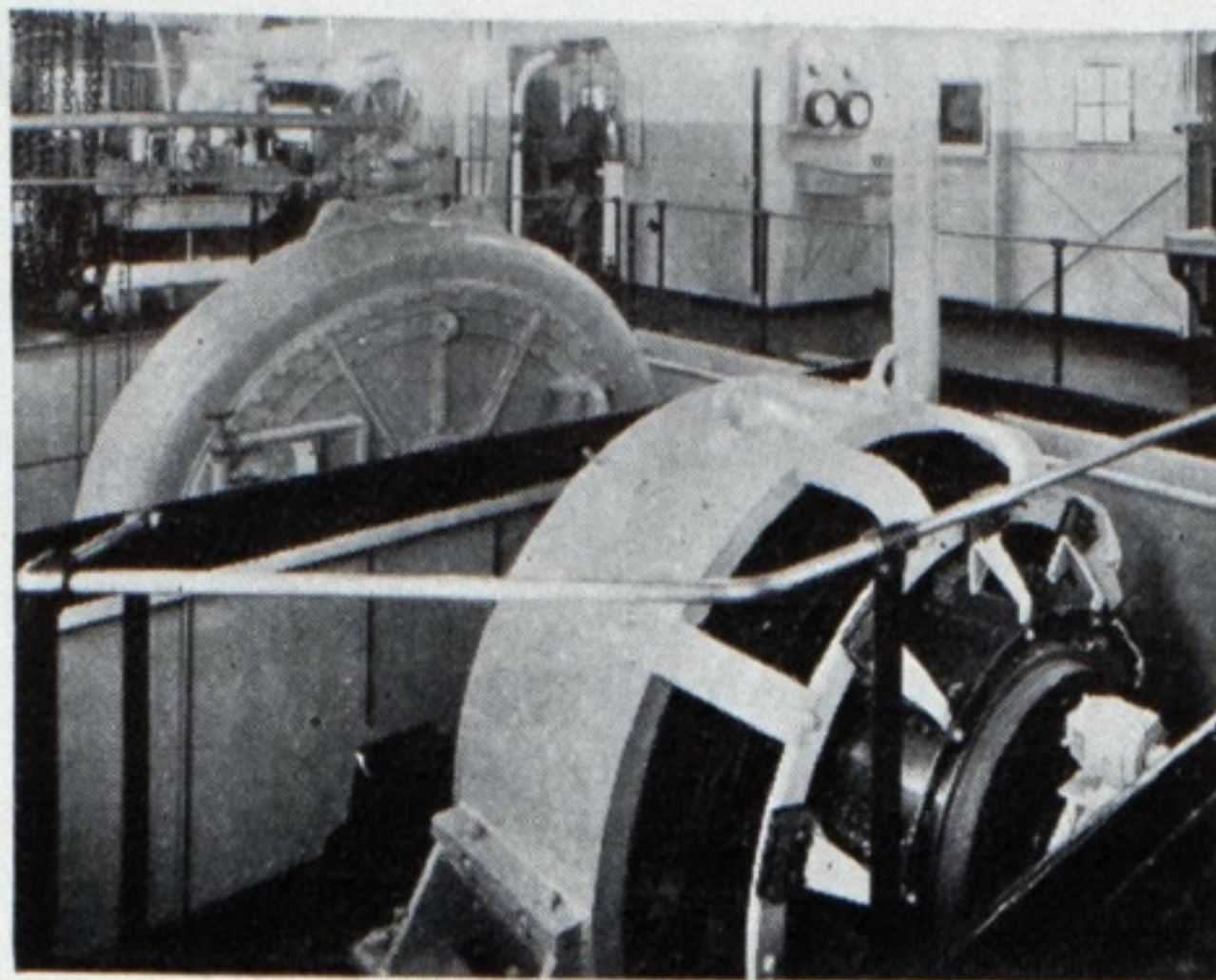
ON THE two large pipe line dredges SAINTE GENEVIEVE and GRAFTON built by the Dravo Contracting Co. and described in the April MARINE REVIEW page 28, electric drive is used for the main dredging plant as well as most of the auxiliaries. The majority of the electrical equipment was supplied by the Westinghouse Electric & Mfg. Co.

The dredging power plant consists of a 1200 kilowatt direct current type geared turbine generator set comprising a 1000 kilowatt, 250-volt main generator and a 200 kilowatt, 250-volt auxiliary unit. In addition, there are provided two 75 kilowatt, steam turbine driven generators for supplying small auxiliaries as well as a 15 kilowatt and a 2 kilowatt unit for stand-by use.

One of the most interesting features of this installation is the special characteristic incorporated in the design of the 1000 kilowatt generator feeding the dredge pump motor which causes it to inherently deliver additional power when a plug attempts to form in the discharge line. This characteristic is made possible through the use of electric drive, and needless to say, is extremely valuable as it exerts a tremendous effect toward clearing the line of its obstruction and eliminates a great deal of lost time due to difficulties of this nature.

The dredge pump is of the centrifugal type and is suitable for pumping through a 20 inch diameter discharge pipe line. It is driven by a 1200 horsepower motor which is fed from the above generator and designed to deliver its full horsepower rating at any speed between 200 and 250 revolutions per minute. This speed range makes possible utilization of full motor horsepower for different lengths of pipe line.

The 200 kilowatt generator which feeds the motor driving the cutter or agitator, is endowed with a characteristic similar to that of the main generator except that it is such as to limit the maximum torque or turning effort which can be applied to the cutter



Dredging Pump Motor, 1200 Horsepower

machinery. This, of course, is desirable as it greatly reduces the shock or strain placed on the machinery when the cutter strikes an obstruction as it frequently does. This generator may also be used for supplying a 200 horsepower jet pump motor when this form of agitation is used.

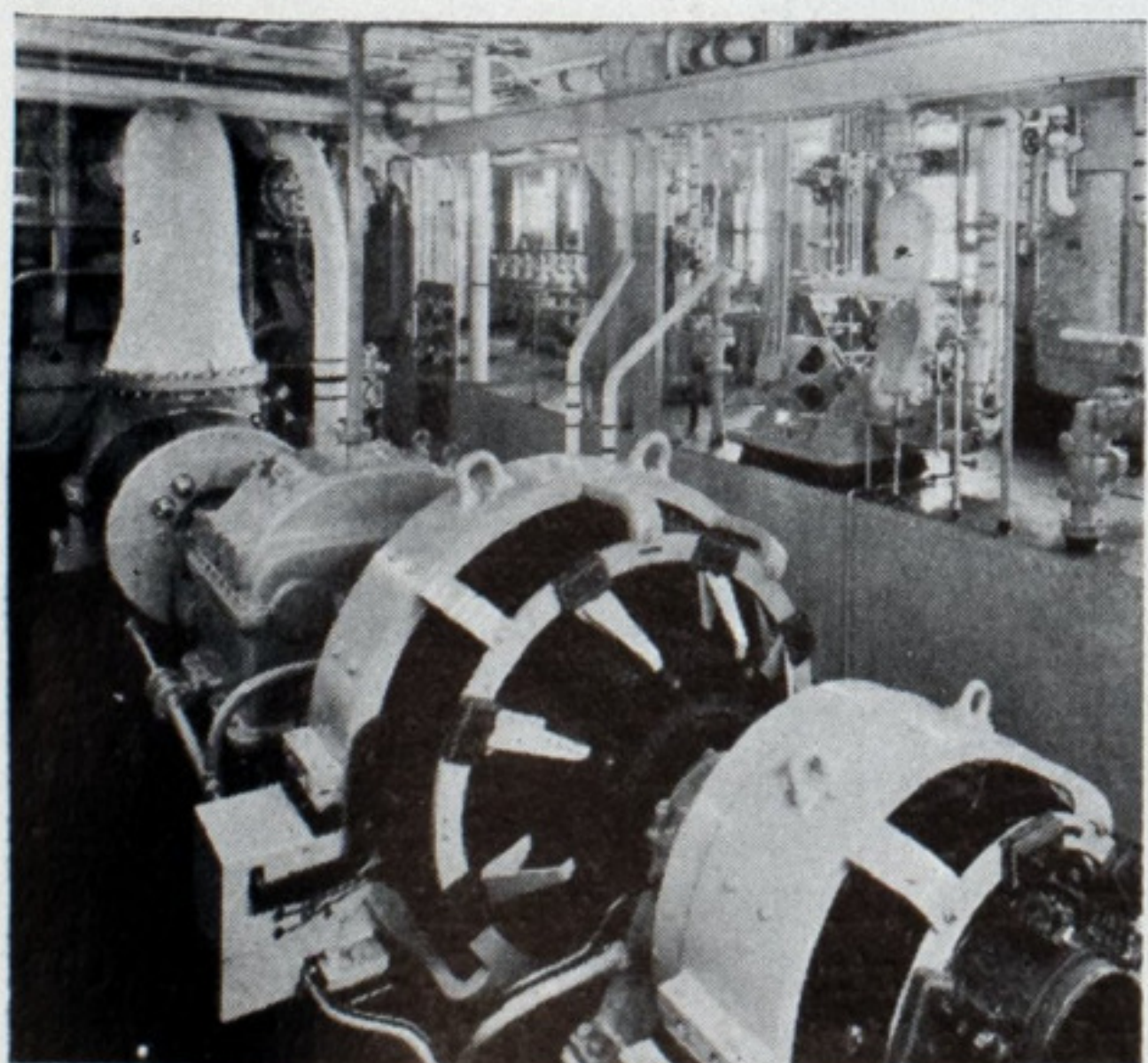
The 225 horsepower cutter motor is geared to the cutter shaft and is mounted in an exposed position directly on the cutter ladder which is pivoted on the bow of the dredge. This motor is therefore water-proof and forced ventilated from a small motor driven fan mounted alongside. It is also equipped with special bearings to permit operation at an angle of 45 degrees with the horizontal.

Oil, Heat Resisting Cable

A NEW cable insulated with Glyptal-treated cloth and capable of resisting oil and withstanding high temperatures has been developed by the General Electric Co., and is now available in all types. In addition to its ability to resist oil and heat, this new cable is characterized by unusual flexibility and toughness that enables it to stand severe mechanical strain.

The insulating material known as Glyptal is a synthetic resin, produced from phthalic anhydride and glycerine, which is unaffected by mineral oil. Because of this inherent quality, Glyptal-treated cloth has a distinct advantage over varnish-treated cloths as an insulation material. This new cloth also maintains its original properties over long periods of time, even at elevated temperatures.

Samples of cable insulated with cloth thus treated have been exposed to temperatures of 100 degrees centigrade for periods of three to four months without showing appreciable deterioration. Cloths treated with varnish, under the same test conditions, deteriorate rapidly by comparison. Despite the fact that some varnish-treated cloths have a dielectric strength slightly higher than that of Glyptal-treated cloth, the latter retains its dielectric strength for a longer period of time under such mechanical abuse as compression, bending, and abrasion.



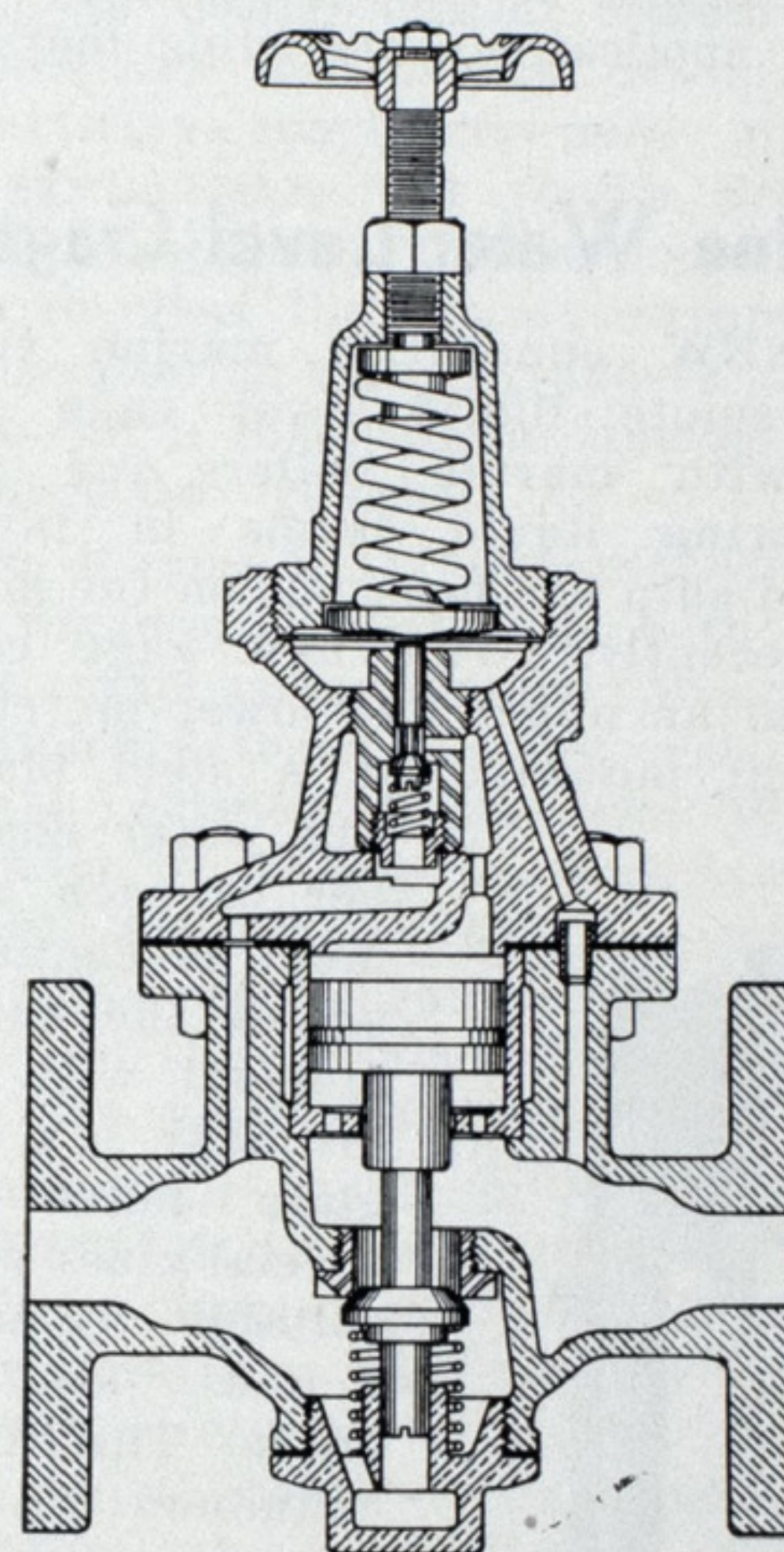
Main Turbine Generator, 1200 Kilowatts

Pressure Regulator Valve With Unique Features

THE precision pressure regulator, manufactured by the O. C. Keckley Co., Chicago, has a number of new and distinctive features, both from design and maintenance standpoint.

The pilot valve, valve cage, spring holder are all combined in a unit assembly, which can be readily removed and replaced. The pilot valve and cage are of stainless steel, accurately ground and polished. Body casings are of highest grade government bronze, insuring maximum strength and are guaranteed for all pressures up to 300 pounds and temperatures up to 550 degrees Fahr.

Main valve and renewable seat are of stainless steel, accurately machined, ground and polished. All



Precision Pressure Regulator Valve

springs are vanadium steel alloy, impervious to temperature variation, accurately wound, ends ground square, heavily cadmium plated.

In operation, the main valve is opened by high pressure acting on the large piston directly above it. The pilot valve, working in conjunction with the diaphragm actuated by any unbalanced effect of the adjusting spring and low pressure beneath it, controls accurately the necessary pressure to the piston. Thus the pilot valve, extremely sensitive to the secondary pressure, opens and closes the main valve in proportionate degrees to maintain the desired constant flow at all times.

Sudden fluctuations in initial pressure are prevented from reaching the secondary side by the expansion chamber effect of the piston

cylinder. Constant pressure on the secondary side will be maintained from zero or dead end to maximum flow capacity of the valve, regardless of wide variations in primary or high pressure side of the line.

Built of the finest materials with precision workmanship, thoroughly tested under all operating conditions, these regulators, with all parts subject to wear readily removable and renewable, offer maximum efficiency, not only as to close regulation, but also dependability through years of service with minimum maintenance.

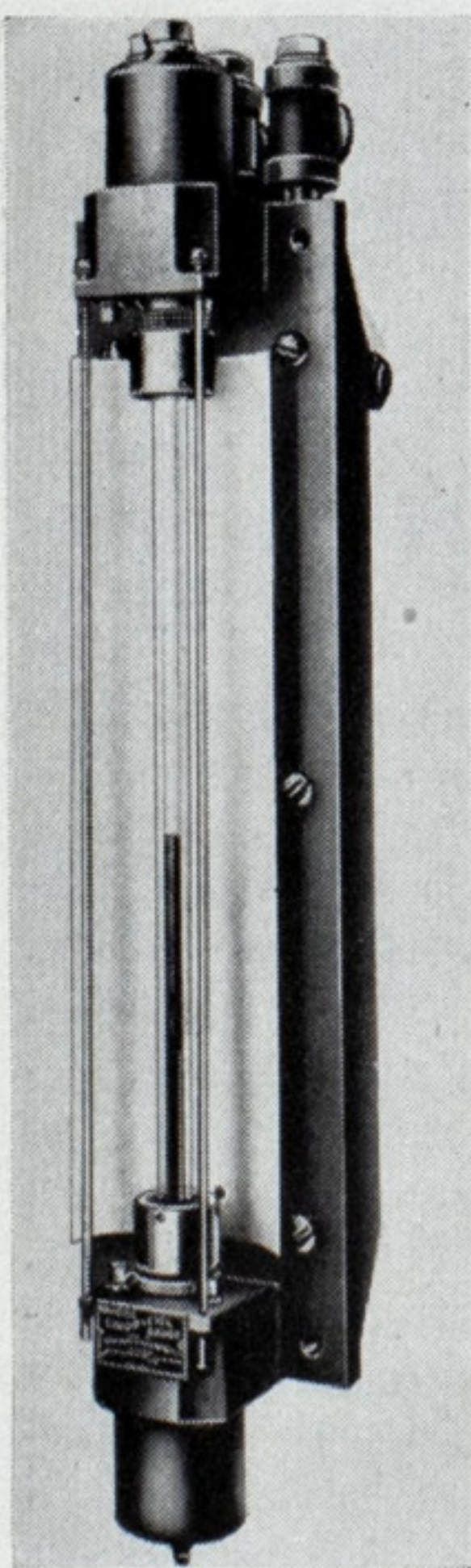
An interesting and valuable modification of the pressure regulator is the Keckley type pump governor, which utilizes many of the valve parts. It is designed without stuffing boxes or external operating arms, and functions to hold extremely accurate pump control with any fixed outlet pressure and is adjustable over a wide variation of pressures, as may be required in many different applications, including marine.

Marine Water Level Gage

A NEW concentric marine type remote liquid level gage for use with marine boilers and for measuring liquid levels in tanks aboard ship has been put on the market recently. This new gage consists of an upper and lower mercury element mounted on a steel plate.

The outer chamber of each element is connected to the other element with an ordinary gage glass made of special glass with suitable glands and stuffing boxes. The inner chambers are connected through the back to the steel mounting plate to the water column with half-inch pipe. Black liquid is the indicating medium which may move direct with the movement of liquid being measured or may be any predetermined ratio of that movement.

The gage is subject only to boiler pressure and never to boiler temperature, and can be located anywhere regardless of the position of the regular water column. It is made by the T. W. McNeill Engineering Equipment Co., 4057 West Van Buren street, Chicago.



Exhaust Turbines Used for Modernizing Vessels

THE arrival in New York on March 24 of the Norwegian-American line passenger steamer BERGENSFJORD directs attention to the satisfactory results in the way of increased power and reduced steam consumption which are being realized through the use of exhaust turbines.

The BERGENSFJORD, of 10,709 gross tons, is a sister ship of the twin screw liner STAVANGERFJORD, which was similarly converted about a year ago by the addition of Bauer-Wach exhaust turbines; and the fact that the average speed of the STAVANGERFJORD was increased from 16.45 to 18.78 knots with some saving in fuel, doubtless influenced the owners in undertaking the conversion of the BERGENSFJORD. The results from the BERGENSFJORD show that the exhaust turbines have added 2500 horsepower to the output of each of the 4800 horsepower quadruple expansion engines for the same fuel consumption, and that when developing the same power as before, the fuel saving is at least 25 per cent. On the trial trip, which was sailed twice between the Weser light vessel and the Norderney light vessel, an average speed of 19.406 knots was realized under conditions of moderate wind and sea; and it was also found that when developing the same speed as was obtained from the piston engines using eight boilers, only five boilers were required with the turbines in service, and the cut-off in the high pressure cylinders could be reduced from 75 to 54 per cent.

Steam is supplied to the engines of the BERGENSFJORD at 210 pounds gage. The propeller revolutions without the turbines were 87.67 for the port engine, and 87.23 for the starboard engine. With the turbines in operation at full power, these speeds were, respectively, 101.85 and 101.44.

With the new equipment, the vessel operates on a faster schedule, while saving about 300 tons of oil per trip, which should pay for the installation in about two and one-half years. Also, due to the extra power, the BERGENSFJORD is enabled to maintain schedules even though delayed a day or two by fog or bad weather.

In case of accident to the reciprocating engines, the vessel can be operated with the turbines alone, giving an additional guarantee of safety.

Electric Welding Method

A NEW development in arc welding, particularly suited to the joining of heavy plates, is announced by the Metal & Thermit Corp., 120 Broadway, New York City.

Known as Murex straight gap welding, the new process does away with all need for "veeing" or groov-

ing of plate edges. Plates may be used just as they come from the mill. Greater welding speed, as well as appreciable reductions in cost, are claimed. The developers of the process say that it cuts welding time in half, and, by eliminating all preparatory work and reducing the quantity of weld metal required, achieves real economy in welding heavy plates. In addition, it is stated, tests conducted by outside

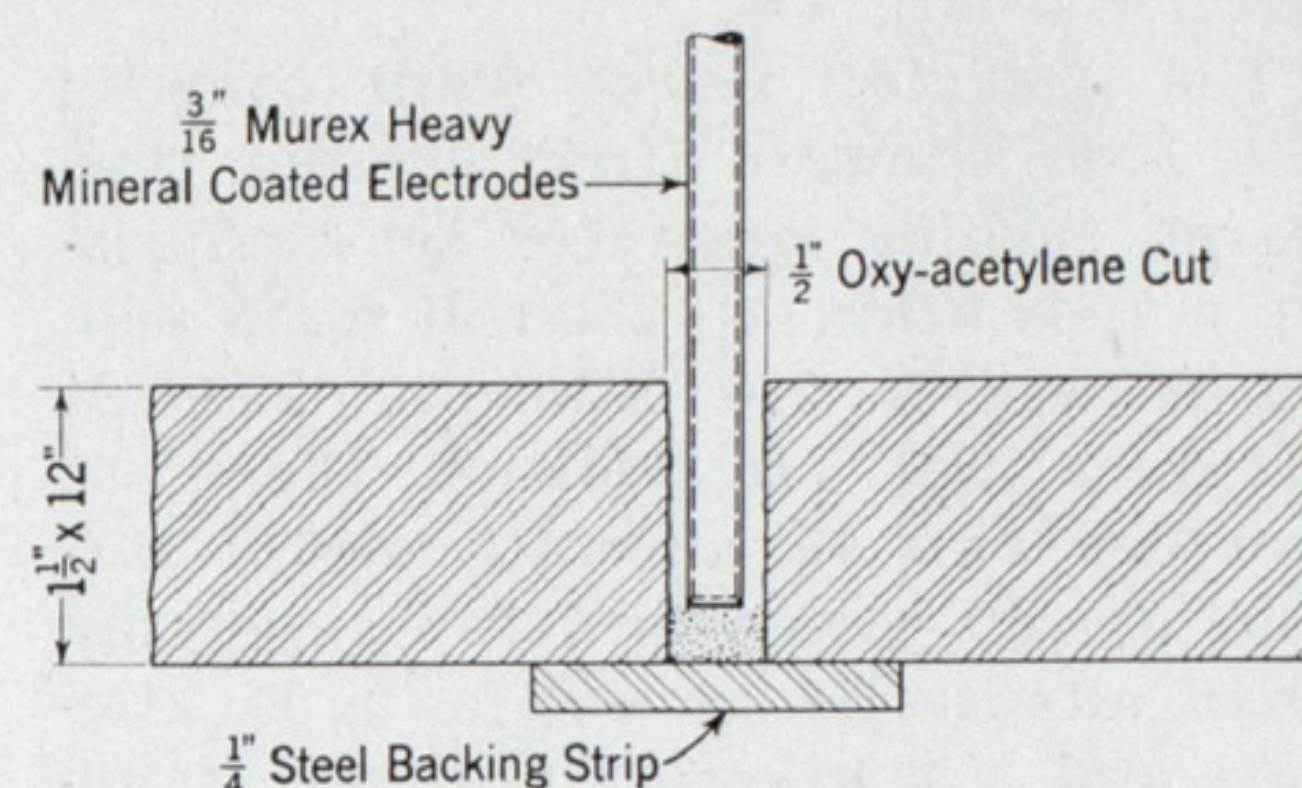


Diagram Showing Gap Welding

laboratories show that straight gap welds are physically superior in many ways to those in which the usual "V" or "U" gaps are employed.

At the same time, the above company announces an addition to its line of Murex heavy mineral coated electrodes. The new unit, Murex universal, is for use on mild steel and may be employed in either flat, vertical, or overhead work. Smooth, clean deposits of unusually high tensile strength and ductility are obtained consistently, it is said, on any of these classes of work.

New Rubber Lined Valve

A NEW rubber lined valve of simple rugged design has recently been developed by the B. F. Goodrich Rubber Co., Akron, O. This valve is designed for handling corrosive and abrasive fluids under conditions of fairly high pressure, pulsating pressure, throttling or suction.

The new valve may be lined with any of the standard Goodrich acid-seal rubber compound, hard or soft, depending upon conditions of service. It is believed to be the nearest approach yet made to a rubber lined valve for universal application.

Action in the valve does not depend upon a flexible diaphragm. The resilient rounded disc which snaps over a circular plate at the lower end of the stem provides an absolute seal when brought in contact with the molded rubber covered seal.

Both disc and ring are simple, inexpensive, and easily replaceable. A steady, uniform flow with positive shut-off is obtained under severe operating conditions. The valve can be used with perfect confidence for vacuum and throttling work.

Early straight line flow makes the valve adaptable to fairly high pressure and abrasive service.

Giant Lock at St. Nazaire Has Two Sliding Gates

AT THE end of October last a new lock of exceptionally large proportions was opened at the French port of St. Nazaire on the Atlantic seaboard. It connects the inner basin, which previously could only be approached through the outer harbor, with the open sea, and is to be used, when required, as a dry dock for the largest liners. Its first task immediately after completion was to accommodate the new giant liner NORMANDIE, which had just been launched. (Oct. 29, 1932)

A description and general characteristics of the NORMANDIE appeared in MARINE REVIEW for December, 1932.

This huge lock, which is 1148.35 feet long, is closed at each end by a sliding gate 169.3 feet wide, more than 52.5 feet high and 29.2 feet thick. These massive gates are of steel lattice work covered partly with dished plates and partly with plain reinforced plates. The gates rest at the front end on a lower carriage with four wheels of 3.28 feet in diameter, and at the rear end they are suspended from an upper carriage which runs over the gate recess. The interior of the gates is divided into ten watertight cells arranged crossways. Five of these cells are filled with water as ballast. They are emptied by a pumping plant in the event of a gate having to be lifted and floated out for repairs to the lower carriage.

The sliding of the gates into the recesses is carried out by means of articulated toothed racks engaging in the upper carriage, a new method of propulsion which has already proved

its efficiency in Geestemuende and in the large North lock at Bremerhaven. As soon as it leaves the driving gear the articulated line of toothed racks, which is guaranteed against buckling by means of a roller guiding, is conducted around a loop in the engine house and returned in the opposite direction, thus effecting a considerable saving of space.

The lock gates were designed and constructed by the Maschinenfabrik Augsburg-Nuernberg A. G., Gustavsburg works.

First All-Welded Vessel Launched on the Tyne

ELECTRIC welding throughout has been used for ship construction in smaller vessels in the United States in several recent instances. One of the latest of these is the United States navy tug Y. T. 119 described on page 24 in the May issue of MARINE REVIEW. This tug is a sizable vessel of 103 feet 10 inches in length overall and with a molded beam of 24 feet. It is evident that this method of construction is now a factor of great importance in shipbuilding, not only in the United States but also in Europe.

On April 12 Swan, Hunter & Wigam Richardson Ltd., launched from its Wallsend shipyard on the Tyne the first vessel built on this historic river in which there was absolutely no riveting used. This vessel is the PETER G. CAMPBELL, a barge for carrying oil in bulk on the Great Lakes and canals of Canada. The dimensions are 179 feet in length, and 34 feet in beam, with a carrying capacity of 1700 tons in four main tanks.

(Continued on Page 40)

By Stream Lining Rudders Speed is Increased

AN INTERESTING development of the benefits derived from stream line rudders has just been demonstrated by the twin screw motorship EMPIRE STATE on her first trip this season from New York to Philadelphia, where the ship loaded for Lake Michigan ports.

The Federal Motorship Corp., Buffalo, operates the EMPIRE STATE and a sister ship, the BUCKEYE STATE, carrying package freight between North Atlantic ports and upper Great Lakes ports. While the time in transit of freight shipped in these vessels has been considerably less than by railroad, George D. MacDonald, president of the owning company, was desirous of still further improving the service.

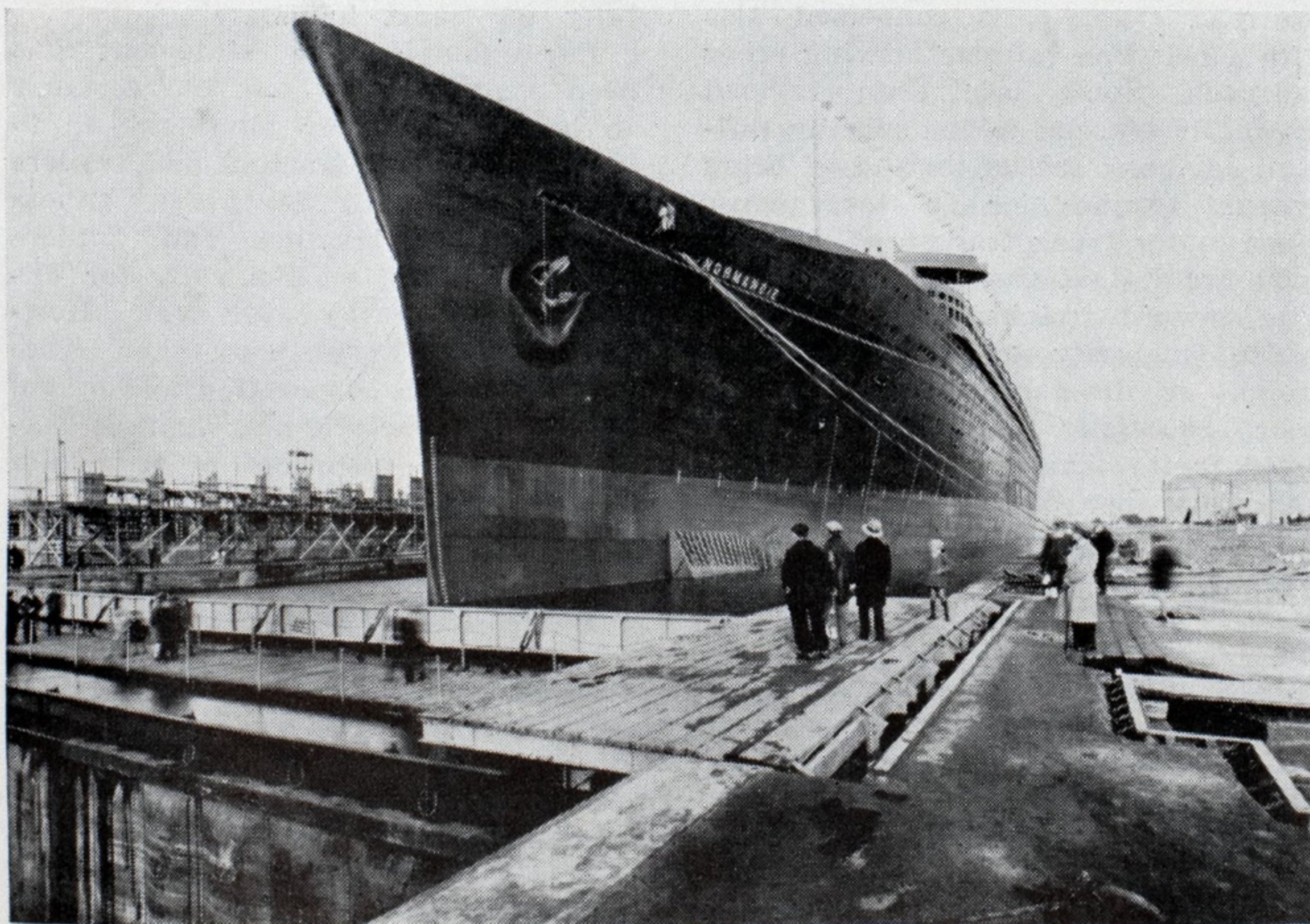
With this in view, George B. Drake, New York, naval architect, was engaged to design special stream line rudders for the EMPIRE STATE. Due to existing conditions none of the standard stream line rudder designs could be applied. It was found possible to effect the desired stream lining by altering the old rudders, thereby saving a considerable amount over building new rudders.

The EMPIRE STATE is equipped with two rudders, as customary with light draft, twin screw vessels. The work of altering these rudders was done by the Atlantic Basin Iron Works, Brooklyn, N. Y., and was accomplished almost entirely by electric welding. The ship's crew unshipped the old rudders and shipped the altered rudders with the vessel lying afloat.

During the run from New York to Philadelphia an accurate comparison of speed before and after the rudder alterations was possible as the ship's log recorded a run in 1932 under almost identical conditions. Furthermore, the speed was observed from a run of over 12 hours, thus offsetting any possible tidal variations. The speed of the ship on the run in 1933 exceeded the speed in 1932 by .73 knots. On the 1933 run, the average revolutions per minute was 6 per cent greater. Adjusting this, the actual gain in speed was .55 knots with the same power and fuel consumption as before the change.

In addition to the rudder improvement the main engine cylinders were bored to ½-inch greater diameter. After the engines have been operated a short time, the revolutions due to the larger cylinder size, will be increased about 15 per hour, which should add another .4 knot to the speed of the vessel.

The EMPIRE STATE and BUCKEYE STATE already have an excellent reputation among shippers and this improvement in speed will add to their popularity.



Giant lock at St. Nazaire, France. Super liner Normandie in place. Opened at time of Launching the Normandie, Oct. 29, 1932

Modern Stevedoring and Dock Management

Practical Ways to Cut Costs in Cargo Handling

Conducted by
H. E. STOCKER

How Specializing in Cargo Handling Produces Efficient Results

By H. E. Stocker

THE American Hawaiian cargo handling operation at the Commonwealth pier at Boston is another example of co-operation between an outside stevedoring company and a steamship company to the distinct advantage of both.

The receipt and delivery of cargo is handled on the pier by the American Hawaiian organization headed by W. K. Hoornbeek. This organization has been trained by the management which has for many years stressed service to the public and the keeping of claims to a low point.

The stevedoring is performed by the Jarka Corp., under the local direction of Capt. P. J. Fanning, assisted by the executive officers of the company at New York.

Tractor Trailer Train Used

The ships are berthed at Commonwealth pier. This pier is 1200 feet long and approximately 150 feet wide. There are depressed tracks running down the center of the pier and a surface track down the apron which is 12 feet wide. There are continuous roller type doors along the shed. This facilitates handling of cargo as compared with piers with less doors along the sides of the shed. Hatches are matched with doors easier and the use of the tractor trailer method of handling cargo is facilitated.

The tractor trailer train is able to go out one door and return by the next door, making a circular route and eliminating backing and filling, a time consuming operation.

There is a 1 x 2-inch channel iron in the floor for the foot of the door. This is designed to prevent water during a storm driving under the door and entering the shed. Wire fencing has been placed along the tracks in the center of the shed and across the ends of the general cargo section to protect the cargo.

Almost the entire outward cargo is received by trucks. Some cargo is received from railroads but none from lighters. The pier is served by the New York, New Haven & Hartford Railroad Co. but is connected also with a belt line railroad serving other railroads. Some less than carload freight is trucked to the pier by railroad company trucks instead of being brought to the pier in ferry cars. Some motor truck trailers of the railroad are left at the pier for loading with inward freight.

The majority of the incoming freight is discharged on the upper floor, especially canned goods and dried fruit. This is piled by marks, and sizes when discharged.

Freight known as railroad freight such as paper, wool, lumber, bales of cotton, etc., is discharged on to the lower deck. The loading of the cars is performed by railroad gangs.

The upper deck is without an apron. This would interfere with the handling of cargo but for the portable platforms hung from the side of the pier. The inner end of these platforms rests in the door sill so the trailers are run on to and off the platform without difficulty.

The main cargo handling equipment consists of three wheel gasoline tractors and all steel caster type trailers with 3 x 8-foot platforms and fitted with automatic couplers. One of three trailers are handled in a tractor trailer train depending on the length of the haul. When the haul is short, the hook is well served with one tractor handling one trailer at a time.

This, and other similar operations have proved the incorrectness of the statement of some men that tractors and trailers cannot be used successfully for short hauls.

For example, the statement has been made that where the distance to be run is fairly long, say up to 800 or 1000 feet, tractors and trailers may be used to advantage. Others have claimed tractors and trailers cannot be used economically for distances of less than 300 feet. However, here at Boston and other terminals the Jarka corporation and others are using tractors and trailers successfully for distances of less than 50 feet.

Platform Slings Found Useful

Platform slings are used for most of the cargo. Gravity rollers bolted to timbers are used in the ship for handling cargo between the square of the hatch and place of stowage.

In making up slingloads of canned goods, the cases on the top tier are placed on edge so that the strain of the spreaders is against the ends of the cans instead of the side. This avoids denting the cans.

The loaded sling is landed on the trailer at shipside. The trailers are hauled from this point to separation area on the pier where they are uncoupled. The tractor picks up an empty trailer or two together with platform slings and returns to shipside.

On the upper deck, by use of overhung platforms (previously described) trailers are backed outside of door and directly under fall. Platform and load are landed and towed to separation pile by tractor. In case of canned goods and dried fruit there are quite a few separations to be made. These are made in small piles, so that all marks may be worked from trailers at one time without moving and also so not to have too long a distance for men to carry cases. The trailer is placed in center of bay. The men start piling against wall and at side of driveway, working in and towards the trailers. If many marks, they work in the space of two stanchions or 30 x 30 feet which restricts the maximum walking distance to 15 feet. When this space is filled, they move to another set of bays. One (at times two) checkers or separators work, with the men, watching separation of marks and sizes. All canned goods are separated to consignee, marks, sizes of cans; contents of cans, and brands. Stacks are made 8 to 10 cases high and room between inside and outside piles is left for trucks to back into and load from either side. All marks stowed outside.

When possible, all cargo, except wet cargo, is placed in the inside bays leaving the outside bays open and clear for movement of the tractor trailer trains. Wet cargo, such as green hides, acid, sheep pelts, etc., are placed in the outside bays. Large rolls are placed on a skid and taken to the inside bays for the railroad loaders to load into cars with chisel trucks. This is a very smooth effective operation. Barrels, small rolls of paper and similar cargo is handled on "pie plate" slings. These slings are made up of a circular platform six feet in diameter placed in the center of a net sling. This sling has proved very handy and keeps cargo from becoming damaged by falling from the sling.

Bales of cotton are discharged with rope slings onto trailers and hauled to the far side of the pier where they are taken to the pile with hand trucks.

Handling Freight by Truck

When trucks arrive to pick up cargo at the pier, the driver is given a pass which shows the number of cases on the truck (if any) the number of the truck and the time of arrival. Delivery order is presented to the delivery clerk, pier stowage is indicated and order to checker given to the truckman. The checkers stand by at the delivery office and go down

the pier with the trucks as they come in the gates.

When the truck is loaded the checker returns to the delivery office with the papers. The truck driver is required to sign receipt and return his pass as he leaves the pier.

Shipments are received on any form of dock receipt presented by a driver. These are stamped with the ship's name, discharging port, routing, if any, also whether wet or special cargo.

These receipts are numbered consecutively by ship, regardless of ports of discharge. The original is taken by the driver down the pier to the checker. The duplicates are kept in the office. After cargo is delivered and signature of checker received, the driver returns the original to the clerk and any notations by checkers are noted and copy signed by receiving clerk and given to the driver. The copies of the receipt are filed by ports and tonnage figures taken off for loading and stevedores' records and forwarded to the office of the line up-town.

All checkers are stationed down the pier and receive trucks as they come from the gate. This saves them from being forced to walk up and down the pier to take care of the trucks as they arrive.

Distribution of Special Cargo

All special cargo is stopped at the crib. After checking and marking of packages, the truck is taken into the crib and the packages unloaded to respective port piles. At times when heavy packages are received they are allowed to remain on the four wheel trucks or placed directly on the stevedore's trailers to avoid rehandling.

For each destination port cargo is piled in the following piles:

- Wet cargo
- Acid
- Heavy cargo
- Light cargo
- Rubber goods.

Separating cargo in this manner gives the stevedore a good idea of cargo to be loaded and helps in separations in the ship.

The slings and other equipment used in loading the ships is in general the same as that used when discharging.

The stowage in the ships is especially good due to the very effective cooperation that exists between all concerned with stowage and handling of the cargo.

Cargo Handling Executive

The man selected as a cargo handling executive should have something more than mere experience. Experience is recognized by everyone and is valuable and necessary to success. The difficulty is, that many do not differentiate between the mere

passing of time in a certain job or in a certain business, and an experience that has been analyzed and organized. Certainly, organized experience is better than unorganized experience. Experience very often results in filling a man's mind with traditional ways of doing things. We need, rather, the scientific point of view which recognizes traditional ways only as they stand the test of modern conditions and needs. A cargo handling executive should understand engineering methods, yet be broad enough to realize their limitations. "There is, in fact, no logical argument against the full use of the analytical or scientific method in attacking any problem in industry. If all men could be brought to realize the economic advantages of this method of attack over empirical and rule of thumb methods, the standard of production would rise tremendously—Kimball, *Principles of Industrial Organizations*.

Working for a definite program based on a careful study of the situation, will yield greater results than working by fits and starts and waiting until the need presents itself. A goal is established by analysis which saves the retracing of steps. Haphazard and piecemeal attempts to improve conditions are often destructive of efficiency as well as a waste of time and money.

Organized knowledge is the fact, wealth of the world, classified analyzed and formulated into laws, principles and business policies. The fact wealth of the world in such form, can be assimilated into one's own affairs; with the minimum of friction and expense.

The development of science and business, the progress of management, in the last 40 years, has created a vast amount of knowledge bearing on business problems, that must be reckoned with if adequate profits are to be assured.

Taking Advantage of Experience

For example, the president of the Southern Biscuit Co. said, "When we decided to build a new plant for the manufacture of our products, I made up my mind to profit, if possible, by all the mistakes other manufacturers in the same line of business had made in the past."

The idea of modern management is to condense the experience of the world on the desks of its executives so that none but the best methods and facilities will be used. This is sound in theory and the history of modern management in hundreds of industries proves that it works in practice. The greatest achievements in legitimate business are based on such methods.

Training of cargo handling organization in the principles of cargo handling is a necessary and elementary step in economical cargo handling.

Handling Cargo at Port Allen in the Hawaiian Islands

PORT Allen is an open port in Hanapepe bay on the south coast of Kauai island, territory of Hawaii, and although the bay sets into the land its inner portion is shallow and the ships have to lie well out, just within the line of the headlands. It is wide open from the south. The entire coast of this island is rocky and steep. There are mooring buoys for two ships, one for a draft of 40 feet and the other one for 25 feet. All loading is done with small boats.

The port is controlled and operated by the Kauai Railroad Co. the railroad agent also acting as the dock board's representative, ship's agent, harbor master and several other titles. All warehouses, terminals, landings and loading boats are owned by the railroad which also does the stevedoring.

The shore equipment consists of railroad yards and terminals, general freighthouse, sugar warehouse, fuel oil tanks, molasses tanks and pipelines and hose connections to ships. The general cargo pier has a boom of some 40 tons capacity, generally set to the center of the landing, with two smaller booms extending over the boat berths. An elaborate sugar conveyor system is installed direct from the sugar warehouse to five boat berths.

Boats Used as Lighters

The floating equipment consists of 23 boats of 10 to 15 tons capacity and five 40 horsepower gasoline launches. All of which can be hoisted onto the pier in bad weather, landing them on flat cars and rolling clear. At times a platform is built across two boats for large freight and some general cargo.

There is a small breakwater extending from the east shore, on which is located the pipeline connection and a small landing with crane on its inner side. In the protection formed by the breakwater is the sugar landing stage. The sugar warehouses being on the very edge of the bluff, the bags are run down the conveyors and the chutes direct to the landing and directed to the correct berths. Next comes the general cargo landing pier.

This general cargo pier extends a little farther out, being on a small cape within the protected part behind the breakwater. It is built as high as the bluff, so that cars may run out on the end under the cranes. The boats lie at the bottom of this

landing and the slings are hoisted from them.

The sugar is brought from the mills in railroad cars and trucks, and stowed in a separate sugar warehouse. This is quite a large shed, with the tracks running under the covered part and conveyor systems covering the entire plant. From stowage it is dumped into conveyors and taken to the sugar loading berths, which join the warehouse on the edge of the bluff, being virtually an extension of the same building, and leading down to the water.

Conveyors are Used

The pier is all covered and with an extension roof over the boat berths. These are stepped back in, three on one side and two on the other, to afford ease in docking the boats. Two men stand at the top directing the bags, with conveyor gates, to the correct landing in the boats. Bell cords lead to the upper floor to stop the bags when the boats are full. Rope slings are ready laid in the boats and the boat crews, consisting of two men, direct the bags to the proper place on the slings. Two slings abreast and four along in each boat.

After leaving the pier the crews slip the slings through the bight and have them ready for hooking on to ship's falls when arriving alongside. When working five hatches with the 23 boats, there is a very smooth movement of boats in and out. As soon as one is filled another is there to take its place. A boat will be filled and breasted out at right angles to the pier, and an empty one run in head first, with the momentum from being towed in, between the loaded boat and the pier. The launch turns around and a tow rope is thrown to it. All barge boats are equipped with tow ropes at each end and have a tiller ore which is shifted end for end. This eliminates any turning around of the boats, as they are built double ended.

It takes about 7 minutes to tow out to the ship. In coming out the launches take the boats to the hatch served by the boat most nearly empty. The tow rope is thrown off a couple hundred feet away and the headway takes the boat alongside where it is made fast ahead of the working boat, ready to be slacked down into place under the falls, while the empty boat is slacked away astern. There is a continuous boat rope from bow to stern. This shifting is done almost between sling

loads and very little time is lost in exchanging boats. The slings being ready to hook on there is very little time lost in this operation. Empty slings are not brought back each time, but in a lot before the boat is empty.

There are ten men in the hold gang. A table is built up some ten bags high, from which the bags are carried and a flooring made over the hold. Then the table is rebuilt another 8 or 10 bags and they start dropping from the edge and covering the hold 8 bags high. This is repeated for about three tables, the last being about two feet below the hatch coaming, from which the sugar is carried and stacked up in the beams, beam filled. Very good stowage is made in this port, but it is necessary to keep an eye on the lower parts of the hold to avoid dropping down and leaving small cracks between the stacks. The same applies in the beam filling. Winchmen are fairly good, and there is very little damage to the bags.

Pineapples are brought down to the pier in railroad cars and also by trucks on raised skid platforms and are discharged into the general cargo warehouse. Here they are loaded on skid platforms which are placed on flat cars spotted on the depressed trackage in the center of the warehouse. These skids are 4 feet 6 inches x 6 feet built of 2 x 6 inches boards with an eye bolt in each corner. The eye bolts pass through iron straps across each end beneath the timbers. There are four permanently attached manila spreaders with a six foot lead to the spreaders. There is rope netting secured to smaller eye bolts along the sides and built up three feet, these nets are split at two corners to allow them to lie down and cargo to be loaded on the slings easily.

Handling General Cargo

The flat cars are shifted to the general cargo pier under the large boom with the two other booms over the boat landings. This forms two burton falls from the tracks to the berths for lowering the loads into the boats.

These slings are hoisted direct into the hold of the ships center of hatch and cases carried to stowage. No attempt is made to drag the sling loads. The same number of men are used as with sugar. No tonnage figures are obtainable, but the claim is made that 1000 to 1200 cases are handled per gang hour.

Tin plate is handled with rope slings, ten cases to a sling. There is some dragging from under hatch combing. The loads are landed in boats and upon arriving at the landing are hoisted with burton falls to cars. Later hoisted with railroad crane, and landed on trucks for delivery. The same slings being left on for discharging at the mills.

Useful Hints on Cargo Handling



CONVEYORS are used at the port of Kahalui, Maui, Territory of Hawaii for handling sugar. Sugar comes to the pier in box cars. The cars are unloaded by railroad labor into conveyor belts running under the floor of the sugar warehouse in three well runways. Vertical lifts are provided at convenient locations which carry the bags to overhead conveyors running across the warehouse. From these, the bags are transferred to piles in the warehouse or to another belt which runs the length of the pier just outside the shed.

Diverters are placed along the conveyor every five feet for carrying the bags to a portable gantry crane fitted with a conveyor arrangement for transferring the bags to the ship's hold. This crane conveyor is spotted opposite a hatch or sideport. The bags are carried into the hold by gravity chutes from the end of the conveyor at the ship's side. These chutes are sheet iron pipes called "saxaphones," about 15 inches in diameter and crooked enough to slow the movements of the bags. This gravity conveyor is in sections and may be lengthened for lower hold stowage.

From the "saxaphones" the sugar runs onto a table about four feet long from which lead two slides which deliver the bags to two gangs of six men each. They endeavor to build up a high table in the center of the hatch, shifting the chutes from time to time as the sugar is loaded. From these tables they drop the bags forward and aft and to the sides of the ship. A man is stationed below to straighten the bags in stowage.

There are two men on deck watching the conveyor and directing the bags. Two in the hold at the end of the chute and the six men mentioned above, making total of 16 men on the ship. They can handle 1600-1700 bags per hour equivalent to about 72 tons per gang hour when there is a long run of cargo or a large hold to be filled.

Storing Cargo on Skids

SKID platforms are used on the piers at Cristobal C. Z. for handling and storing cargo. These skids are constructed of spruce and pine. The legs made of 2 x 12 inch planks and the platforms of 2 inch planks. The whole is well made being bolted together to give strength and rigidity.

THIS page is being devoted to short items on all matters having to do with the more efficient turn-around of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

When conditions permit, the skids are taken into the ship and loaded there. Otherwise, cargo is transferred to the skids at shipside. Transfer between pier is performed by tractor-trailer trains loaded with skid loads of cargo. The skids are placed on the trailers with high lift electric trucks. A recent observer reports on a train of twelve trailers carrying 250 bags of coffee from Pier 7 to Pier 8. The gang for this operation consisted of one lift truck operator, one tractor driver and two helpers to walk with the trains to steady the load when necessary.

All cargo held over on the piers is kept on skids in the center and part of the outer bays of the sheds. All skid loads are well marked by a card showing marks and destination, placed on a pole about three feet above the load.

Bagged material is stowed two skids high by laying dunnage across the top of the lower skid load to carry the bags of the upper skid.

At one port longshoremen lash blocks around the drums of winches of ships with small drum winches. This increases the diameter of the drum and hence increases the speed of the fall.

There is as much if not more lost by too much regimentation, too much rigidity, than by a more loose jointed organization. Too much regimentation slows down speed of action, curtails individual initiative.

A shipping organization is not organized for the best cargo handling unless some one of executive calibre is spending all his time on cargo handling. It requires expert attention all the time to get the best results. Only a good executive can

judge comparative efficiency of two terminals, because so much is a matter of judgment.

Platform slings are used for handling pineapple at Houston. The slingload is hoisted with a burton fall and landed on a trailer. From shipside the trailer is taken by two men to the shed door where pier laborers take the trailer and haul to separation spot. There the cases are unloaded and stacked by marks. At times there are as many as thirty marks running at one time.

At New Orleans cases of pineapple are separated on the wharf in piles two cases wide with all marks showing. A clerk is able to walk entirely around a pile and see the mark on each case. When the cases are coming out of the ship one clerk is at each pile as the negro longshoremen have to be watched carefully in separating marks.

Facilities Used at Houston

AT HOUSTON there is an elaborate installation of overhead conveyors with automatic electric trolleys and cars for handling cotton from the compress to storage compartments. Each car holds four bales. Once started the car continues until stopped by operator or run against an automatic stop.

Tractor-trailer trains are also used for handling cotton at Houston. Agricultural type tractors are used. The trailers have a low platform to facilitate handling the bales to and from the trailer. Five bales are loaded to a trailer and ten trailers are hauled in a train.

Kutch stows 18 bags to the ton in 32 cubic feet. It is very hard to stack up into any form and it softens quickly in the sun, somewhat like tar, packed in burlap with outer covering of mat bags. It should be stowed away from the boiler casings.

Cotton can be loaded or discharged to lighter using ships boom 150 to 175 bales an hour. Working through side ports eighteen men can load two hundred bales an hour.

Up and Down the Great Lakes

Lake and Canal Traffic Increases—Lake Levels—New York to Chicago—Stop Diversion—Officers Elected—Ban on Overcrowding

STATISTICS published by the Canadian government show that traffic on the Great Lakes this year is much improved over a year ago.

The United States locks at Sault Ste. Marie opened for traffic April 19, and the Canadian lock opened April 20. In 1932 both the United States and the Canadian locks opened on April 17. This year the Welland ship canal opened on April 4, three days earlier than 1932, and the St. Lawrence canal opened April 14, the same date as in 1932.

A heavy movement of wheat passed through all three canals, 12,315,488 bushels passing through the Sault Ste. Marie canals, 9,039,366 bushels through the Welland ship canal, including 246,300 bushels upbound from Kingston to Duluth, and 8,044,466 bushels through the St. Lawrence canals.

The total freight tonnage through the Sault Ste. Marie canals, Canadian and United States locks, for April, 1933, was 695,712 tons as compared with 368,961 tons for April, 1932. The commodities included in this movement were flour, wheat, other grains, iron ore, soft coal, and hard coal. The total freight in tons through the Welland ship canal for the month of April this year amounted to 587,854 tons as compared with 464,668 tons for April, 1932. The total freight through the St. Lawrence canals for April this year amounted to 352,098 tons as compared with 278,926 tons for April a year ago.

John A. Ubsdell Dies

John A. Ubsdell, president and general manager of the Great Lakes Engineering Works, River Rouge, Mich., died at his home at Grosse Isle, Mich., on May 15.

He was born in New York City 66 years ago. As a youth he was taken by his parents to England and was educated at Eton. On his return to the United States he attended the Naval academy at Annapolis, Md., for a period of three years. He then entered Rensselaer Polytechnic institute at Troy, N. Y., where he graduated in civil engineering in 1886. For 12 years he was associated with the Chicago Shipbuilding Co.

Shortly after the Great Lakes Engineering Works was organized, in

1902, he joined its managing staff as general superintendent. During the World war he was appointed general manager. In 1920 he was elected president of the company.

He contributed many improvements in the construction of vessels on the Great Lakes. During the war period, a world record for speed was set by the Great Lakes Engineering Works, under his management, in building the vessel CRAWL KEYS, in exactly 29 days from the laying of her keel until she sailed.

Mr. Ubsdell served as a lieutenant in the United States navy during the Spanish American war. He was a member of the Institution of Naval Architects, the Society of Naval Architects and Marine Engineers and the American Society of Civil Engineering. He also belonged to a number of clubs including the University club of New York. He is survived by his wife and two daughters.

April Lake Levels

The United States Lake survey reports the monthly mean stages of the Great Lakes for the month of April as follows:

Lakes	Feet above mean sea level
Superior	601.89
Michigan-Huron	577.96
St. Clair	574.23
Erie	571.64
Ontario	244.85

Lake Superior was 0.08 foot higher than in March and it was 0.02 foot lower than the April stage of a year ago.

Lakes Michigan-Huron were 0.34 foot higher than in March and they were 0.40 foot lower than the April stage of a year ago.

Lake Erie was 0.78 foot higher than in March and it was 0.05 foot higher than the April stage of a year ago.

Lake Ontario was 0.58 foot higher than in March and it was 0.97 foot lower than the April stage of a year ago, 1.12 feet below the average stage of April of the last ten years.

New York Chicago Service

The Colombian Steamship Co. will inaugurate a fast freight service between Chicago and New York this month with the sailing of the steamer BARCOA from the latter city on June

6. Regular fortnightly sailings will be maintained thereafter by this boat and her sister ship, the BOLIVAR.

Running time between the two cities, via the St. Lawrence river and the Great Lakes, will be ten days. The two ships are lake type vessels originally built for the United States shipping board. Acquired several years ago, they have been operating in the New York-West Indies service.

Lake Water Diversion

The Supreme Court on May 22 held that the state of Illinois is responsible for complying with the decree of the court to reduce to 1500 cubic feet per second the diversion of water from Lake Michigan and that this must be done by the end of 1938.

The decision, by Chief Justice Hughes who had acted as special master for the court when the original decree was handed down, held without dissent that the state of Illinois was responsible and that the Chicago sanitary district was merely its creature. Therefore, the state is expected by the court to supply the necessary funds so that the diversion may be reduced to 1500 cubic feet within the time set. Edward F. McClennen of Boston reported on this case as special master for the court.

Shipyard Officers Elected

On May 20 at a meeting in Detroit of the directors of the Great Lakes Engineering Works, Fred G. Morley was elected president and George B. Turnbull vice president to take the place of the late John A. Ubsdell, president and general manager. John T. Webster continues as vice president in charge of the Cleveland office.

Capt. T. C. Balfour, 74 years of age, died at Portland, Oreg., on May 14.

Captain Balfour since 1910 had been master of ships for the Franklin Steamship Co. Last year he commanded the AMORY FORD.

The exploit for which he is best known is the rescue of more than 20 men from the barge HARTNELL when the steamer KIRBY went aground on Lake Superior.

Turbine Electric Drive Has Twenty-fifth Anniversary

This year marks the twenty-fifth anniversary of the turbine-electric ship and, likewise, the twenty-fifth year that the General Electric Co. has been engaged in the manufacture of marine propulsion equipment.

In 1908, the city of Chicago placed in service two fireboats, the GRAEME STEWART and JOSEPH MEDILL, both propelled by turbine-electric apparatus. The electric generators and propelling motors were of the direct-current type and the fire pumps were placed on extensions of the generator shafts, thus enabling the equipment to serve a double purpose. Both vessels are still in commission after 25 years of service. The electrical apparatus for these two boats comprised the first marine propulsion installation made by the General Electric Co.

Goodrich Steamers Sold

On May 10 the nine steamers of the Goodrich Transit Co., which has been in receivership for some time, were sold for a total amount of \$7,500. The appraised value of the nine vessels was \$1,025,000. Only three bidders appeared, all representing groups of first mortgage bond holders. The steamers ALABAMA, CHRISTOPHER COLUMBUS and CAROLINA were sold for \$2500 to the First Union Trust & Savings Bank, Chicago. The ILLINOIS was sold to Francis Bloodgood Jr., Milwaukee, for \$1500.

The remaining five vessels, BENTON HARBOR, the CITY OF GRAND RAPIDS, SAGATUCK, HOLLAND and ST. JOSEPH, were sold for \$3500 to D. P. Merrick representing the Michigan Trust Co., Grand Rapids, Mich. The appraised value of these five vessels was \$525,000.

New Drafts Announced

Capt. R. W. England, chairman of the shore captain's committee of the Lake Carriers association, on May 19 announced a new recommended draft of 18 feet for St. Mary's river and 18 feet, 6 inches for Lake St. Clair, and Detroit rivers.

It was pointed out that these drafts apply only to the main channels. For available drafts in lesser channels and at the docks, specific information should be obtained and corresponding care should be exercised at time of loading.

To Prevent Overcrowding

Arthur J. Tyrer, assistant director of the bureau of navigation and steamboat inspection is making a special effort to prevent overcrowding of excursion boats.

An augmented staff of inspectors will be stationed at Chicago to protect the thousands of visitors to the World's fair who may take excursion trips on Lake Michigan while in Chicago. Every possible precaution will be taken to prevent accidents. In addition to a larger staff of inspectors, the department's inspection boat will be ordered to Chicago.

Naval Program Needed

To bring the United States navy up to London treaty strength, it was recently estimated by the navy department that 135 ships of 316,530 tons would have to be built by Dec. 31, 1936.

The estimate which was prepared for the senate naval committee listed three aircraft carriers, of 55,200 tons, nine cruisers of 87,100 tons,

Great Lakes Red Book

THE Great Lakes Red Book, vest-pocket directory giving the names of owners, operators, vessels and where appointments have been made, captains and engineers of all shipping on the Great Lakes, is out for the year 1933 in its thirtieth annual edition. The Red Book is published each year at Cleveland by MARINE REVIEW under the direction of A. H. Jansson, editor.

The 1933 edition of the Red Book lists over 1500 vessels of the Great Lakes. There is also a complete directory of the ship-building and ship repair yards on the Great Lakes. This directory gives the names of all principal officers and the drydock, repair and building facilities at each yard.

Individual vessels and fleets are alphabetically arranged. The capacities of all ore carriers are given and there is also a complete port directory.

89 destroyers of 133,500 tons and 34 submarines of 40,730 tons.

The memorandum called attention to the fact that Great Britain has had a uniform building program in each recent year of three cruisers, nine destroyers, three submarines, and several miscellaneous craft. Japan's 1933 program it was said, includes all authorized replacements except 5200 tons of destroyers that may be laid down in 1935 with the same amount in 1936.

The Ludlow Valve Mfg. Co., Troy, N. Y., recently appointed J. W. Frazier Co., Western Reserve building, Cleveland, as its representative in this district.

New England's Position on Transportation Problem

In connection with the national transportation problem now being given consideration by the administration in Washington, the following opinion was sent by the Maritime association of the Boston Chamber of commerce to Daniel C. Roper, secretary of commerce:

"Providing regulation of water common carriers is co-ordinated with equivalent regulation of rail, highway and air transportation, the Maritime association of the Boston Chamber of commerce representing New England maritime interests is in sympathy with such regulation. Because of inevitable conflicts between these various transportation agencies requiring judicial balancing of factors involved, we consider it imperative that regulatory body include adequate representation of men experienced in water transportation to have jurisdiction over the water lines. If modification of Panama canal act to permit railroad ownership and operation of steamships is under consideration, will appreciate opportunity to present our views in opposition."

Increased Travel Expected

Quebec's terminal transatlantic service by the Canadian Pacific's white Empress liners will last six months in 1933, with 16 arrivals and departures scheduled for the EMPRESS OF BRITAIN and EMPRESS OF AUSTRALIA. Starting with the arrival of the BRITAIN, May 8, there will be two westbound voyages in that month, four in June, one in July, four in August, two in September, two in October and one in November.

In preparation for an anticipated heavy movement of Canadian and American tourists attracted to Europe by the splendid position of the dollar in relation to Continental currency, eastbound sailings have been planned to provide a maximum number of sailings during the height of the rush. Led off by the EMPRESS OF BRITAIN, departures for Southampton and Cherbourg occur at the rate of two in May, three in June, two in July, three in August, three in September, two in October and two in November.

The EMPRESS OF BRITAIN closes the Quebec-Southampton-Cherbourg season with her final departure on Nov. 10.

Edward P. Connell has been appointed a vice president of The Falk Corp., Milwaukee, Wis. He has been with the Falk company since 1913 and was made comptroller in 1924. He will continue to hold that office under his new appointment.

Reviews of Late Books

Brown's Signal Reminder; International code, semaphore and Morse; all methods; published by Brown, Son & Ferguson Ltd., Glasgow, supplied by MARINE REVIEW for 1s. 6d. plus postage, and in Europe by the Penton Publishing Co., Caxton House, London.

It would seem that this *Signal Reminder* might be very useful for every ship's officer. It contains in colors, of course, alphabetical flags and signal meanings; also, numerical pendants, substitutes and use of substitutes. There is also a two, three and four flag group. Brief notes on the arrangement of the international code are given, as well as the correct use of international code semaphore. Distress signals and signals for pilot and quarantine are also given.

A complete diagram of standard semaphore signals is also given. It contains the international Morse code and procedure signs. Commander Meads' new method of learning Morse is illustrated. The pendant is shown by which the ship can indicate that it wishes to exercise the new code. This little *Signal Reminder* consists merely of four cardboard sheets, about $6\frac{1}{2}$ x $4\frac{1}{4}$ inches, and is printed in the colors required.

The Minimum Requirement of Professional Capacity in the Case of Captains, Navigating and Engineer Officers in Charge of Watches on Board Merchant Ships; by the International Labor Conference, Geneva; paper, 106 pages, $8\frac{1}{2}$ x $5\frac{1}{2}$ inches; issued abroad and available in the United States only through the American agent, the World Peace Foundation, Boston; price, 25 cents.

The object of the International Labor Office in dealing with this subject is the adoption of international regulations by which, in the interest of the protection of crews, persons who control the movements of a ship, whether on deck or in the engine room, would not be allowed to perform such important duties unless their fitness and competency for discharging them had first been proved to the satisfaction of the public authorities and they had obtained certificates attesting their qualifications for them.

Wire Splicing by R. Scot Skirving, paper, 48 pages, $7\frac{1}{4}$ x $4\frac{3}{4}$ inches, numerous illustration, published by Brown, Son & Ferguson Ltd., Glasgow, supplied by MARINE REVIEW for 50 cents plus 15 cents postage, and in Europe by the Penton Publishing Co. Ltd., Caxton House, London.

In this little book an attempt is made, as the author himself says, to teach a beginner to make wire splices

without personal practical instruction from a professional rigger, which, of course, is far the best way of learning a somewhat difficult art. In his foreword, the author calls attention to the fact that nearly all riggers have their own way of making splices—as the old sea saying has it, regarding various things, “different ships, different long splices.”

The book describes in clear language and in detail the methods considered best for wire splicing. The instruction is intended particularly for apprentices, junior officers and yachtsmen. By following the directions given, it is possible to obtain an excellent first-hand knowledge of this craft which is still an important necessity on board even the most modern ships. All officers ought to know how to do this work. This book will also be found interesting to the amateur and give him the necessary knowledge to mend the rigging of its own vessel.

Report of Structural Steel Welding Committee of the American Bureau of Welding; paper, 9 x 6 inches, 208 pages; published by the American Welding Society, New York, and supplied by MARINE REVIEW, Cleveland, for \$1 and in Europe by the Penton Publishing Co., Caxton House, London.

This report constitutes a complete record of the activities to date of this committee, organized in 1926 for the purpose of obtaining reliable information upon which to base safe unit working stresses in the designing of welded structures. A comprehensive series of tests were made and the committee's conclusions are necessarily based on the behavior of the particular specimens investigated. With a view to extending the scope of its conclusions, the committee recommends a number of desirable fields for further research. The report is amplified with 54 illustrations and 18 tables.

The Ratproofing of Vessels, third edition, by S. B. Grubbs, medical director, and B. E. Holsendorf, chief pharmacist, United States Public Health Service; paper, 84 pages, 9 x 6 inches; for sale by the Superintendent of Documents, Washington; price, 20 cents.

The importance of eliminating or permanently controlling rat life on shipboard is universally recognized both as a means of preventing the spread of bubonic plague as well as an economic measure to reduce losses sustained through damage to cargoes, ships' stores, etc., by rats.

This publication in addition to giving a brief history of rat life existing on vessels, cites many typical

examples of how structural and other conditions are responsible for the usual rat harborages found on ships, and indicates how they may be eliminated in new construction by proper design, or corrected on vessels already in service in such a way as to be effective.

General instructions and information in detail are given in the specification contained in Standard H. No. 41-1929, of the American Marine Standards Committee, approved February 8, 1929, which is incorporated in this pamphlet.

The lighthouse service, department of commerce, Washington, has issued a pamphlet on *Radiobeacons and Radiobeacon Navigation*. The pamphlet is supplied by the superintendent of documents, Washington, for 15 cents.

The Port of Detroit, Mich., Lake Series No. 2, by Corps of Engineers, United States Army and the Bureau of Operations, United States Shipping Board; paper, 122 pages, 9 x 6 inches; published by the United States Government Printing Office, Washington, and supplied by the Superintendent of Documents, Washington; price, 45 cents.

This volume is one of a series of studies of the principal ports on the Great Lakes recently undertaken to meet the needs of the government, and to supply valuable data for the use of lake shippers, manufacturers, railroads, steamship lines and the general public.

The report contains information regarding port and harbor conditions; port customs and regulations; services and charges; fuel and supplies; facilities available for service to commerce and shipping, including piers, wharves, grain elevators, ship repair plants, dry docks, coal and oil bunkering facilities, storage warehouses, bulk freight accommodation, floating equipment, and wrecking and salvage facilities; railroad and steamship lines, and their charges and practices in connection with terminal service.

The foreign and domestic commerce is discussed, and tables are presented showing in detail the business of the port during recent years. Data and charts are presented showing the origin of lake receipts and the destination of lake shipments at Detroit, by ports and principal commodities.

Among the interesting exhibits of the Electric Storage Battery Co. at the Century of Progress fair at Chicago will be a section of the electric storage battery taken from the City of New York which was used by Admiral Byrd on his Antarctic trip. The Exide battery used by Admiral Byrd on his flight over the North Pole will also be exhibited.

Personal Sketches of Marine Men

George F. Thorndyke, President, Thorndyke Shipping Co. and Western Stevedore Co.

By Robert C. Hill

BORN and raised in an atmosphere of shipping, his father a sea captain in clipper ships, he came to the Northwest on a sailing ship.

ACTIVE in North Pacific shipping for half a century, he has participated in the steady expansion of Seattle into a great world port.

LONG experienced in competition with foreign shipping, he firmly believes the country needs to develop an adequate merchant marine of its own.



WITH the blood of sturdy New England stock in his veins, it was natural that George F. Thorndyke should heed the call of the sea. Now as president of the Thorndyke Shipping Co. and Western Stevedore Co., Seattle, he is rounding out half a century of active association with North Pacific shipping. He first entered the port of Seattle June 24, 1883, on the bark LIZZIE WILLIAMS, Capt. Frank Parker.

Born at South Thomaston, Knox county, Maine, he was raised in an atmosphere of shipping. Capt. Eben A. Thorndyke, his father, was a famous sailing ship master. In 1878, Captain Thorndyke visited Seattle in command of the celebrated clipper ship BARING BROTHERS. He envisioned this port as a future center of world shipping and was so impressed that he bought property in the town.

Shortly after his arrival in Puget Sound he became freight clerk on the famous steamer CITY OF KINGSTON, at that time operated by the Puget Sound & Alaska Steamship Co., subsidiary of the Northern Pacific railway, on a daily schedule between Tacoma and Victoria, B. C. Later he served as purser and then was brought ashore as agent. The CITY OF KINGSTON had been built on the Hudson and had negotiated the long Cape Horn passage.

Mr. Thorndyke then became traffic manager and later manager of the Globe Navigation Co. Five wooden schooners, named after members of the company—WILLIAM NOTTINGHAM, WILLIS A. HOLDEN, ALEX T. BROWN, J. W. CLISE and WILBERT L. SMITH—were built at Seattle. For many years these vessels expanded the deep sea commerce of Puget sound, freighting cargoes of lumber to South America, Japan, China, Australia and South Africa. Many fast voyages were made by these fine fore-and-afters, one of the best being 35 days from Callao to Puget sound by the WILBERT L. SMITH. The Globe Navigation Co. also brought out from the Great Lakes the steel steamers METEOR, EUREKA and TAMPICO, later sold to the Pacific Coast Co.

In 1914 Mr. Thorndyke began business on his own account. He and J. D. Trenholm formed the Thorndyke-Trenholm Co. They were soon in the center of World war activity. Business was brisk in chartering and sales.

The company figured in some of the largest transactions of the period. The firm was appointed North Pacific agents for the French government. France had placed orders for a large fleet of wood motor ships in Oregon and Washington. Thorndyke-Trenholm outfitted, chartered and dispatched 17 of these vessels. The job, well done, received the commendation of the French High commission.

After the death of his partner, Mr. Thorndyke reorganized under his own name and carried on. The company acted as operating agent for nine voyages of shipping board vessels in offshore trades, turning over to the government a balance of \$15,000 in profits, a record, according to the late Senator Wesley L. Jones, equaled by only two and excelled by no other firm handling shipping board tonnage.

Mr. Thorndyke's next venture was the organization of the Western Stevedore Co. which has been conducted with great success. Its accounts include some of the largest berth lines operating to this section. He continues to give this business his active supervision in addition to acting as agent for other lines.

Mr. Thorndyke has always been an advocate of a strong American merchant marine. He is convinced that national defense and the interests of American shippers can best be served by a virile American merchant marine.

As he views Seattle's harbor, dotted with ships from every country, and sees the modern terminal facilities in this great world-port, he recalls his father's prophecy and knows that the old shipmaster's vision has been realized but that the present great development is only the beginning of a still greater future.

Mr. Thorndyke is widely known among the shipping fraternity throughout the country. His office is decorated with fine paintings of many of the famous clipper ships of the last century. He has had an active and honorable career in shipping and he is still fighting for a merchant marine that will adequately represent this great republic.

He is a man of simple tastes. Although he is a member of several clubs, his work and his happy home life are his greatest pleasures.

Tank Experiments

(Continued from Page 18)

First of all, consider blade section. Experimental results have shown the moderate air foil section will give an efficiency of 2 to 4 per cent better than a circular back section with sharp edges, but, if combined with a suitable outline of blades, the efficiency gain over an elliptic outline circular back screw rises to 10 per cent at moderate slips, the gain disappearing as the slip increases and vanishing at about 40 per cent slip.

The term "suitable" outline here has a meaning differing with type of screw. Tests have shown that a blade with narrow tips gives somewhat better efficiency than one with wide tips, but in ballast condition or when pitching, these screws fail to hold their thrust, and they cannot be accepted on single screw vessels.

All propellers fall into two classes, those cast in one piece and those with removable blades. The former invariably have a smaller diameter boss than the latter. A large diameter boss gives more room between the blades at the boss and so eliminates any evil effect of overlap of blades. It occasionally happens that such a screw with a blunt cone gives as good a result as a propeller with quite a small boss—when sufficient attention has not been paid on the latter to the root section and gap effect.

Propeller Location and Boss

He then discusses at considerable length experiments with long bosses, types and location of rudders, rudder posts, and the general inter-relation of the propeller with the immediately adjacent ship's structure and rudder. In this connection quite often the design of the screw begins by drawing in the rudder post, adding a fin or contra blade, or any special rudder, putting in a tip clearing of about 5 inches for a thin fin, to 9 inches for an Oertzh rudder post, in a 400 foot ship, and so obtaining the position of the blade tips in side elevation.

Toward the end of his paper, Mr. Baker discusses the interaction between screws and the hull, and the effect of this upon design; finally suggesting that conditions which produce wake fractions in excess of 0.2 should be closely examined to see that an unstable or inefficient screw action is not involved.

Manager of Engineering

The appointment of Roy C. Muir, for three years assistant to the late Charles E. Eveleth, vice president in charge of engineering, as manager of the engineering department of the General Electric Co., has been announced by President Gerard Swope.

In his new capacity, Mr. Muir will have direct charge of the company's designing engineering in all of its various plants, the works laboratories, and the general engineering laboratory at Schenectady. He has been associated with Mr. Eveleth for three years and with the General Electric Co. for the past 28 years, and his engineering experience covers a wide range of applications and developments, including three years as chief commercial engineer of the International General Electric Co.

Historic Voyage Recalled

(Continued from Page 21)

was not used until Nov. 30, forty days out from Arendale when Captain Rogers "took a pilot inside the bar, anchored in the Savannah river, got under way with steam and went up and anchored off the town," six months and eight days after she had set forth upon her historic voyage.

Thus the SAVANNAH returned in triumph to the port of origin after she had conquered the ocean twice, had visited the great ports of northern Europe and had demonstrated to the world a new triumph of American mercantile enterprise. It was eight years before another steamship was to attempt the Atlantic. The SAVANNAH stands alone as the pioneer ocean steamship, binder of nations and forerunner of a new epoch in world progress.

This first experiment in trans-oceanic steam navigation ended, like so many other experiments in financial disaster for the projectors. The SAVANNAH carried not a single passenger for hire, or a single pound of freight on her memorable voyage. She had brought new glory to the American merchant marine but she had cost her owners a lot of money.

After being divested of her engine, the SAVANNAH ran as a sailing packet between New York and Savannah under command of Capt. Nathan Holdredge. She failed as a steamship because of the large amount of space required for machinery and fuel, leaving insufficient room for cargo. On Nov. 5, 1821 she was driven ashore in a gale on the south shore of Long Island where she pounded to pieces.

She survived her gallant commander by 21 days. In an unknown grave, in Georgetown, S. C., lie the mortal remains of Capt. Moses Rogers. And in the sands of Long Island sound, buried from wind and wave lie the stout oak-timbers of the S. S. SAVANNAH, which bequeathed to the sea a new master, and to man a new weapon of progress.

Pier organizations must be flexible when volume of business fluctuates sharply, otherwise when tonnage falls off costs increase to an abnormal figure.

First All Welded Vessel

(Continued from Page 31)

each of which is divided by longitudinal bulkheads into two compartments making eight in all. Piping is so arranged that any compartment may be filled independently and oil can be discharged simultaneously over each side of the vessel. The pump room is located at the after end and the electric generating room is located nearby. Accommodations are also provided for a crew.

This vessel is built on the longitudinal principle of framing to the survey of the British Corp. for Dominion Tankers Ltd., Toronto. The entire hull with its frames, beams and decks and bulkheads has been electrically welded throughout. According to the shipbuilder the result is a lighter and more rigid structure than is obtainable by the ordinary method of riveted construction, and the cost no greater.

For a considerable period of time before attempting the application of electric welding to what might be termed a major vessel, Swan, Hunter & Wigham Richardson has been studying and experimenting in developing satisfactory methods of electric welding. A large number of skilled artisans have been carefully trained to carry out this new kind of shipbuilding in the most efficient manner. The fine appearance of the PETER G. CAMPBELL is indicative of the skill with which the work of welding the shell plating has been accomplished.

The plates of the hull, the decks, and bulkheads have their edges butted against each other and welded, leaving a flush surface. Deck fittings such as bollards, ventilator necks, hatch coamings and other deck erections and equipment are all electrically welded. The entire job is neat and workmanlike in appearance and not a rivet has been used in the entire ship. The shipbuilder expresses the opinion that the modern development exemplified in the construction of this electrically welded oil carrying vessel may well bring about a revolution in the shipbuilding industry.

Regulations Prescribed

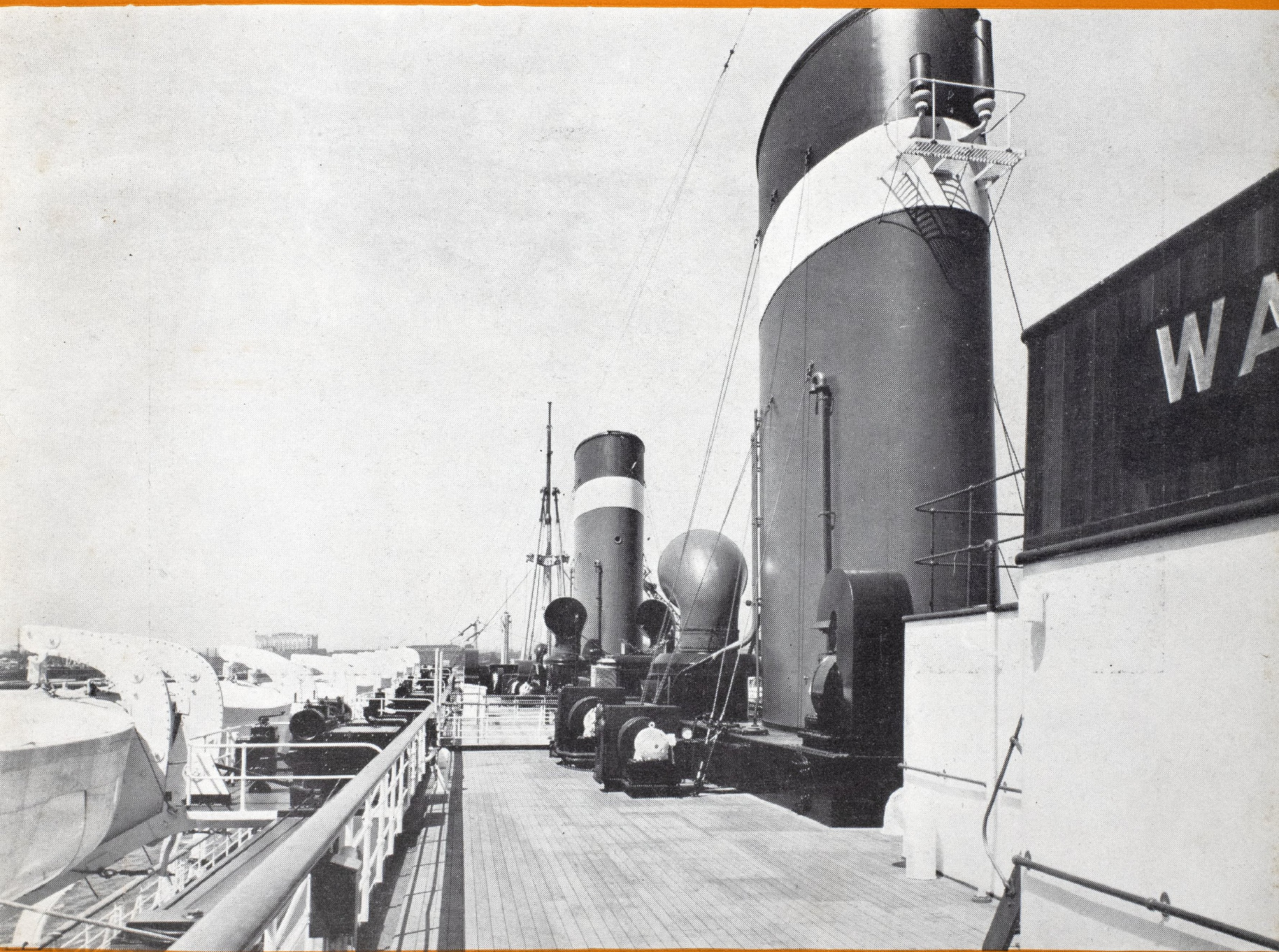
The shipping board on April 26 approved regulations for filing of schedules required under the inter-coastal shipping act, 1933, to stabilize rates in the United States inter-coastal trade.

The law requires that from and after 90 days from its enactment, which was March 3, 1933, no persons shall engage in transportation as a common carrier by water in inter-coastal commerce unless and until schedules as provided have been properly filed and posted. Schedules must be on file in Washington not later than June 1, 1933.

Marine Review

Reg.
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Off.

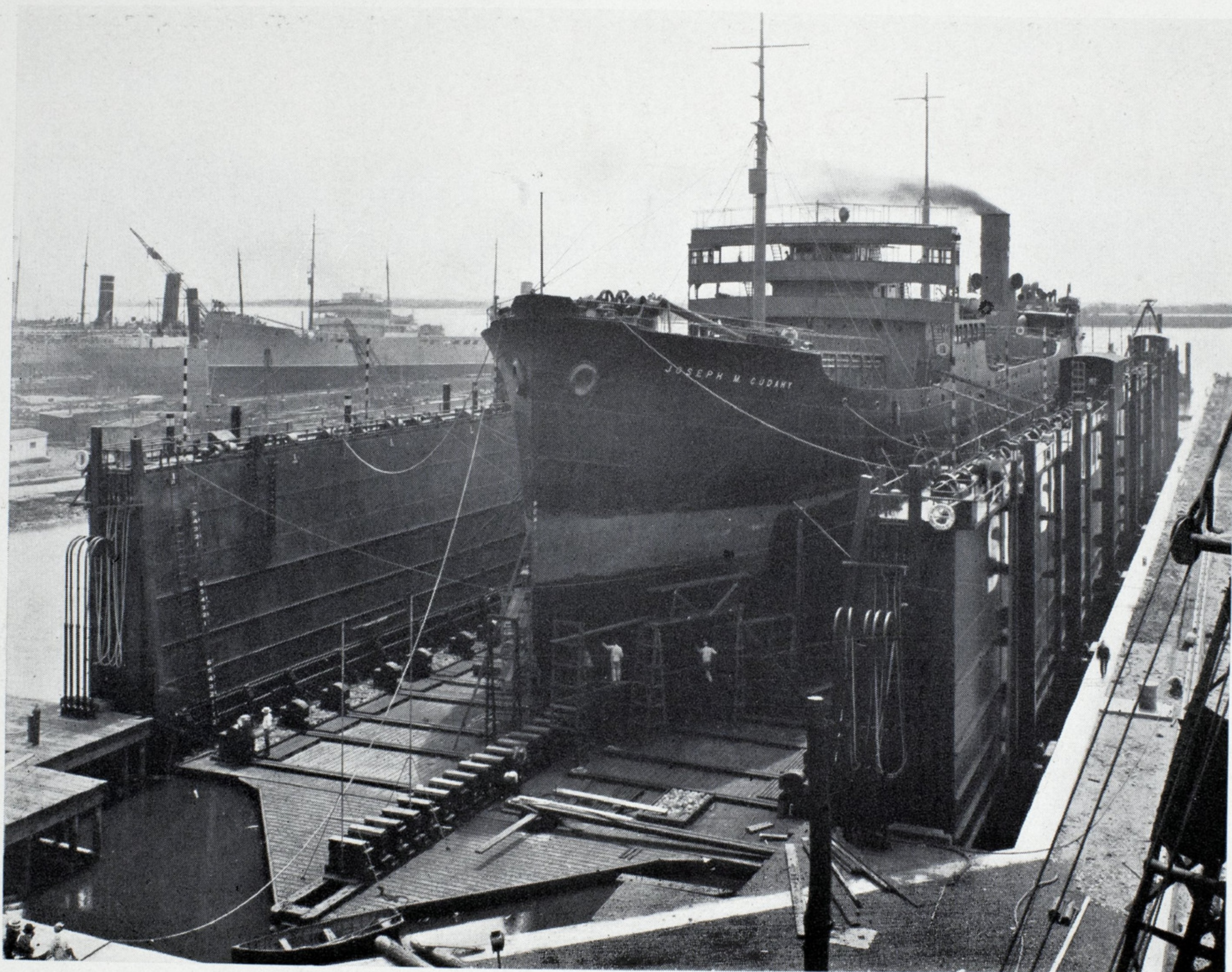
*The National Publication Covering the Business of
Transportation by Water*



Sun Deck—T. S. S. WASHINGTON

June, 1933

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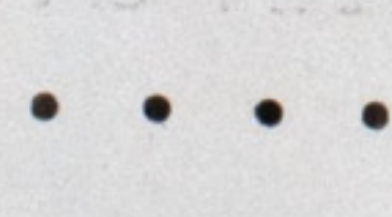
Estimates on new equipment or changes in old equipment, now in your files, based on material and labor costs that have been prevailing, are bound to be lower than those which must follow in the wake of advancing prices.

Obviously old estimates, based upon old conditions, cannot long be protected. Changes in conditions are taking place daily. Prices are jumping.

If you have quotations on work that you are likely to want, may we suggest the wisdom and economy of immediate decisions and instructions.

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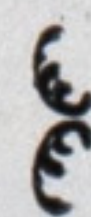
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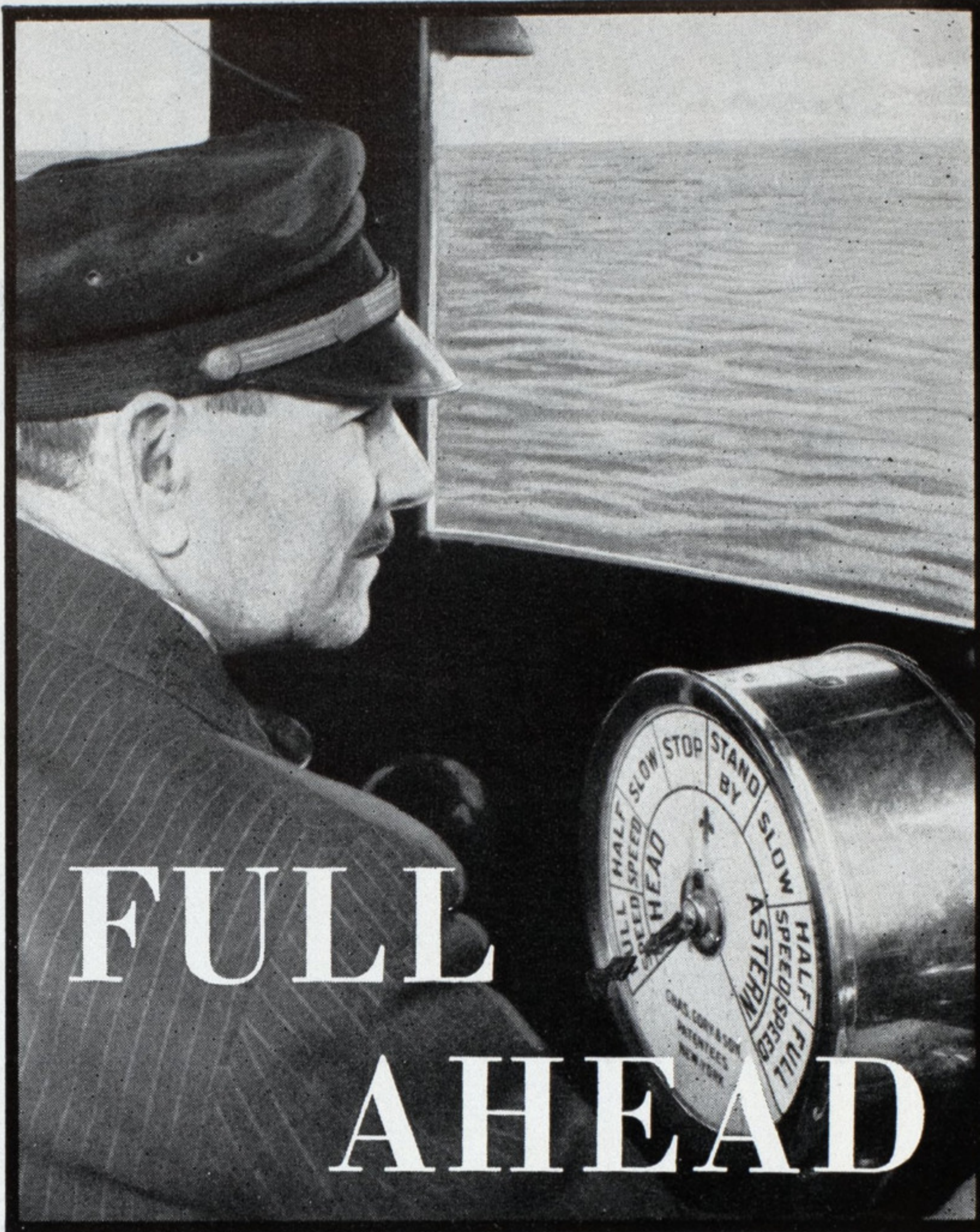
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But, under full power ... her oil couldn't stand up

For years, Gargoyle Marine Oils had given efficient, economical service in this ocean-going tug.

Then it was decided that, after all, "oil is oil." Over the protests of the chief engineer, Gargoyle Marine Oils came out — ordinary oils went in.

For six or seven months, things seemed to be going smoothly enough. But daily wear often does not log its course. One day, an S.O.S.! "Full Ahead" signaled the bridge! "Emergency!" shouted down speaking tube. The engine room leaped into action!

Under ordinary conditions—at normal running speeds—the new oil hadn't yet given evidence of its inefficiency. But, under full power, its shortcomings were clear—*it couldn't stand up*. Before long, the tug heaved to—with burned-

out bearings caused by incorrect lubrication.

Performance records of a large part of the world's tonnage confirm this tug's experience—prove that *Gargoyle Marine Oils give complete protection and cost less to use*. You, too, will find that Gargoyle Marine Oils save power, reduce fuel and oil consumption, minimize repair bills, and increase engine life.

The Vacuum representative in any leading port will be glad to assist you in reducing today's engine-room costs.

Meanwhile, send for one of these helpful books: "Marine Lubrication — Motorships", "Turbine-Propelled Steamships", or "Steamships with Reciprocating Engines." Address Vacuum Oil Company, Inc., Marine Sales Dept. D-6 26 Broadway, New York City.



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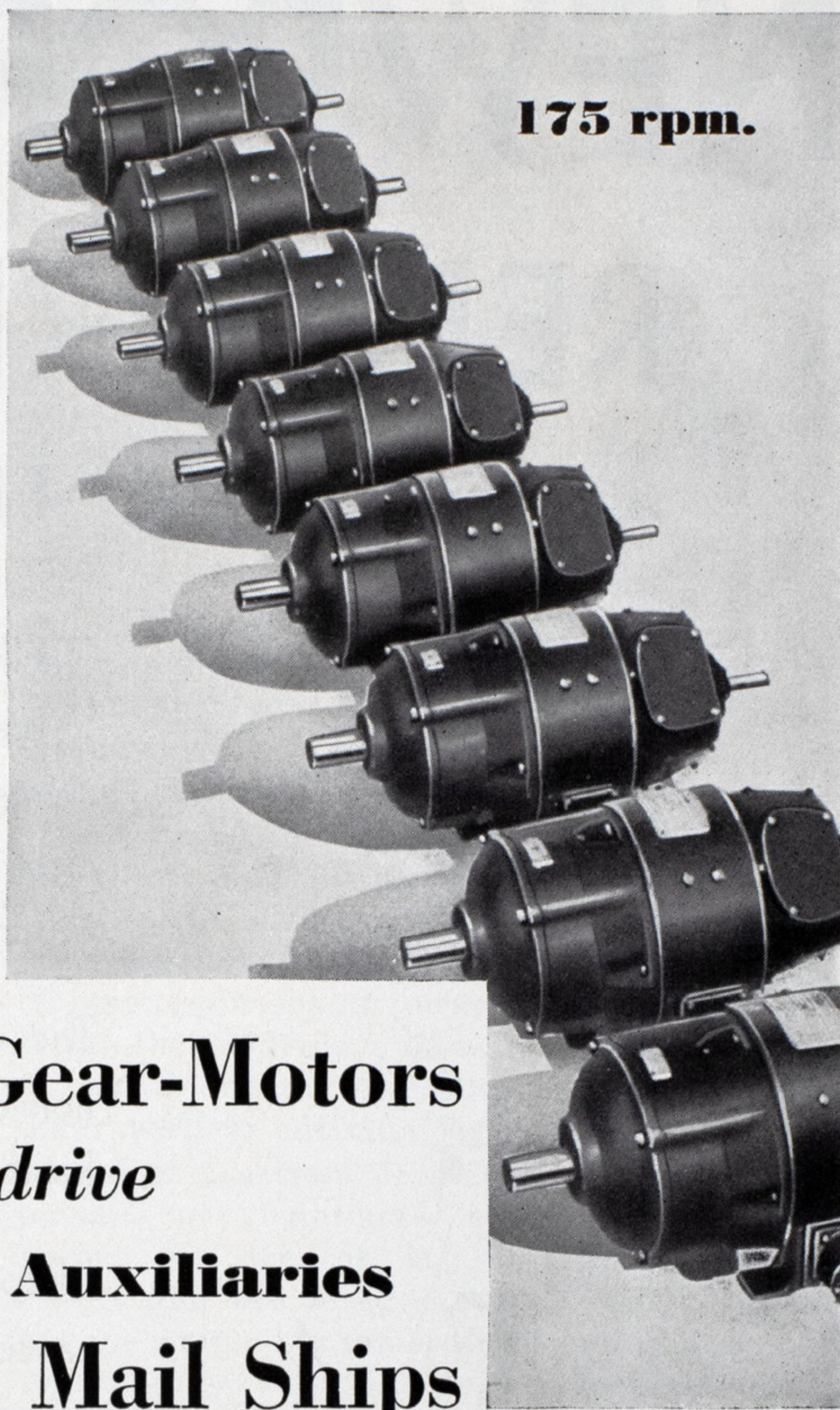
The existence and operation of an adequate fleet of American ships will benefit industry and business throughout the land; increase employment of American workers both ashore and afloat; contribute to this country's international prestige and serve in the national defense. » » » » » » »

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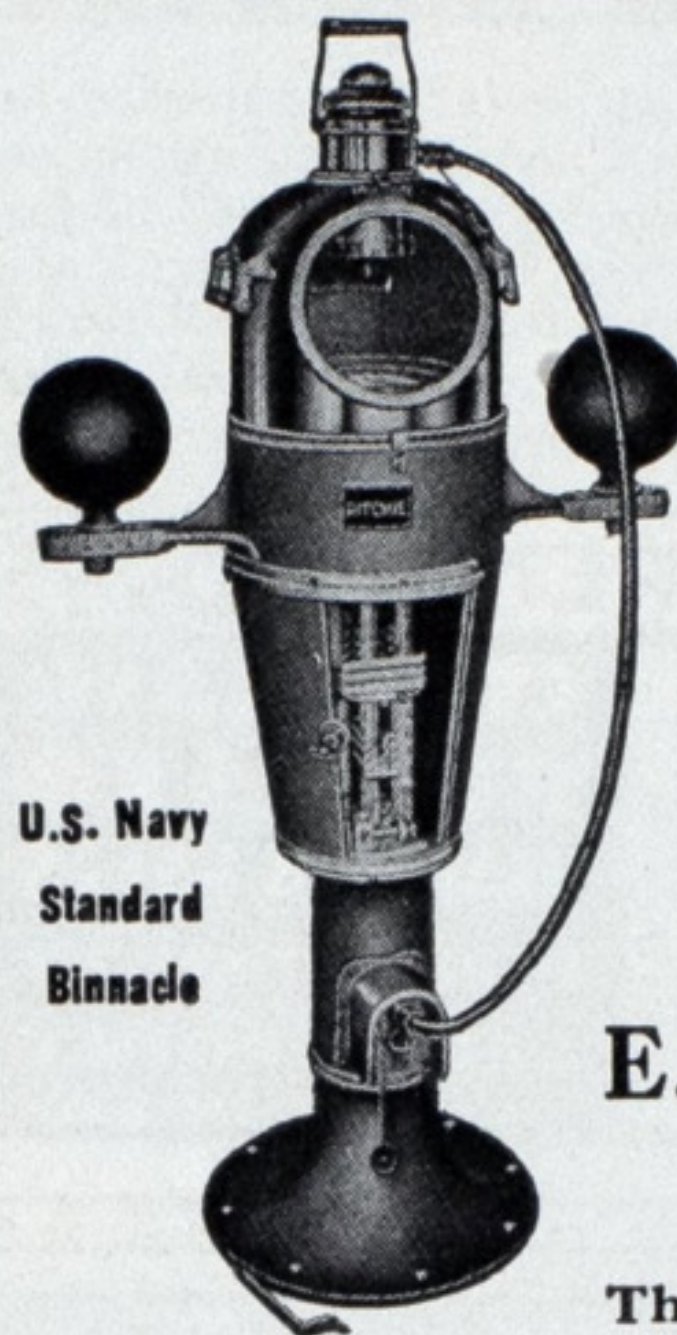
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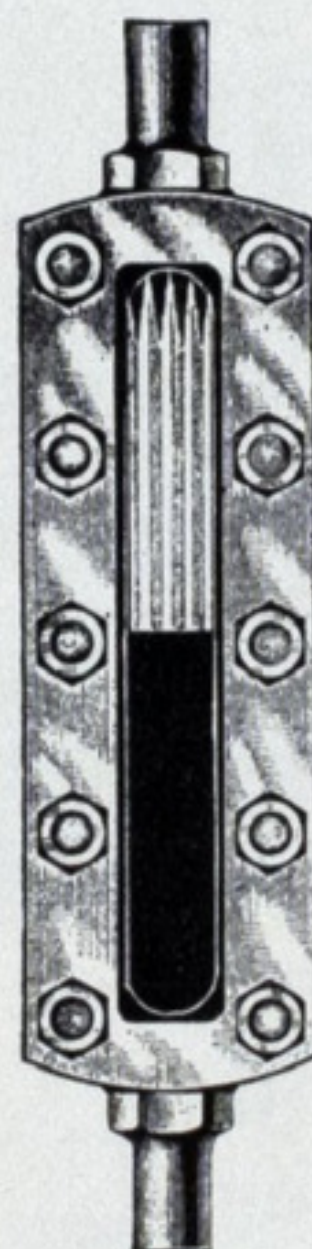
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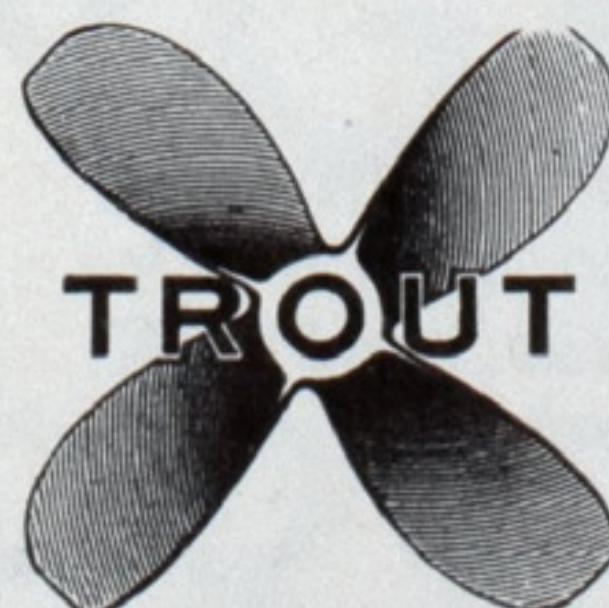
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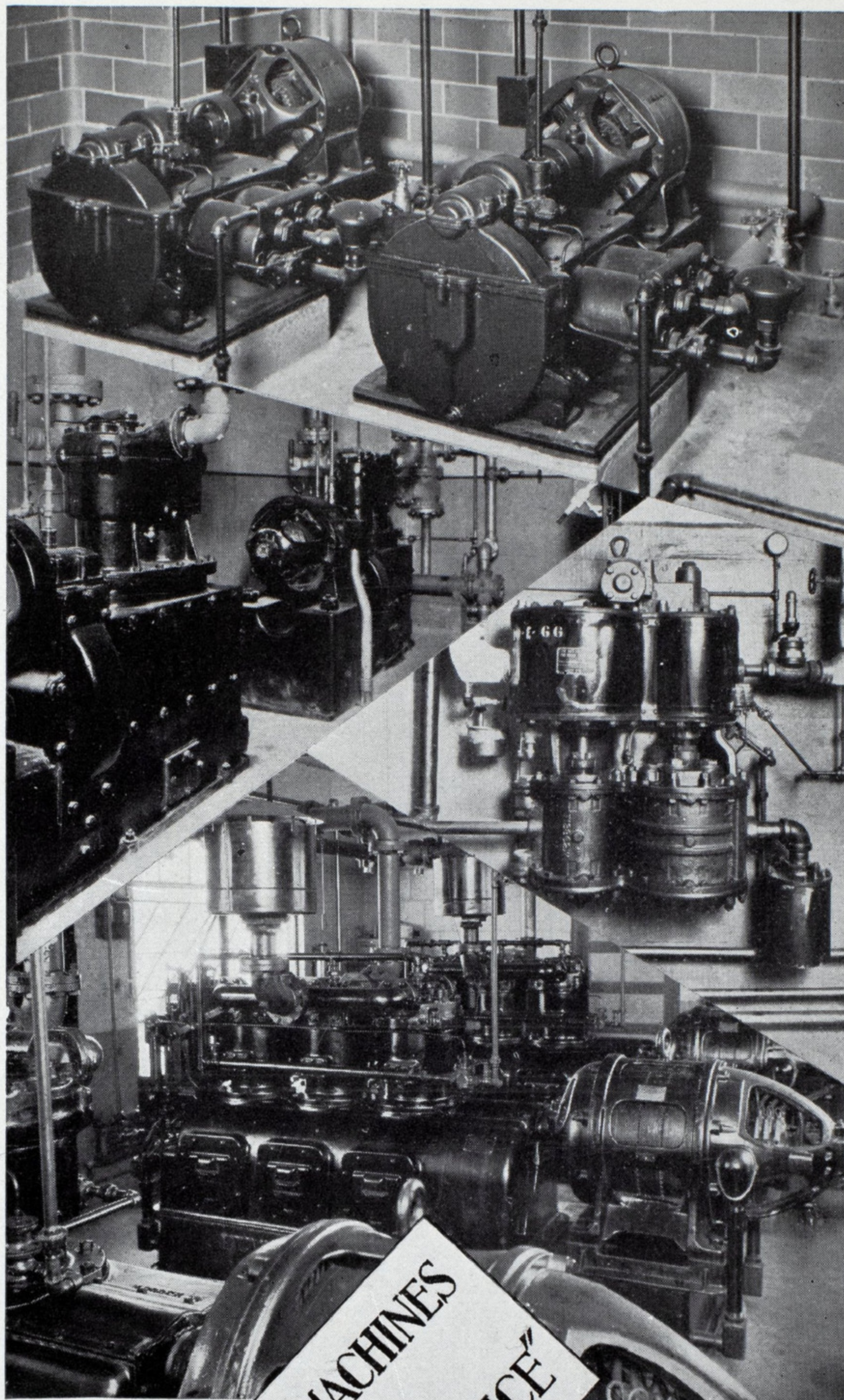
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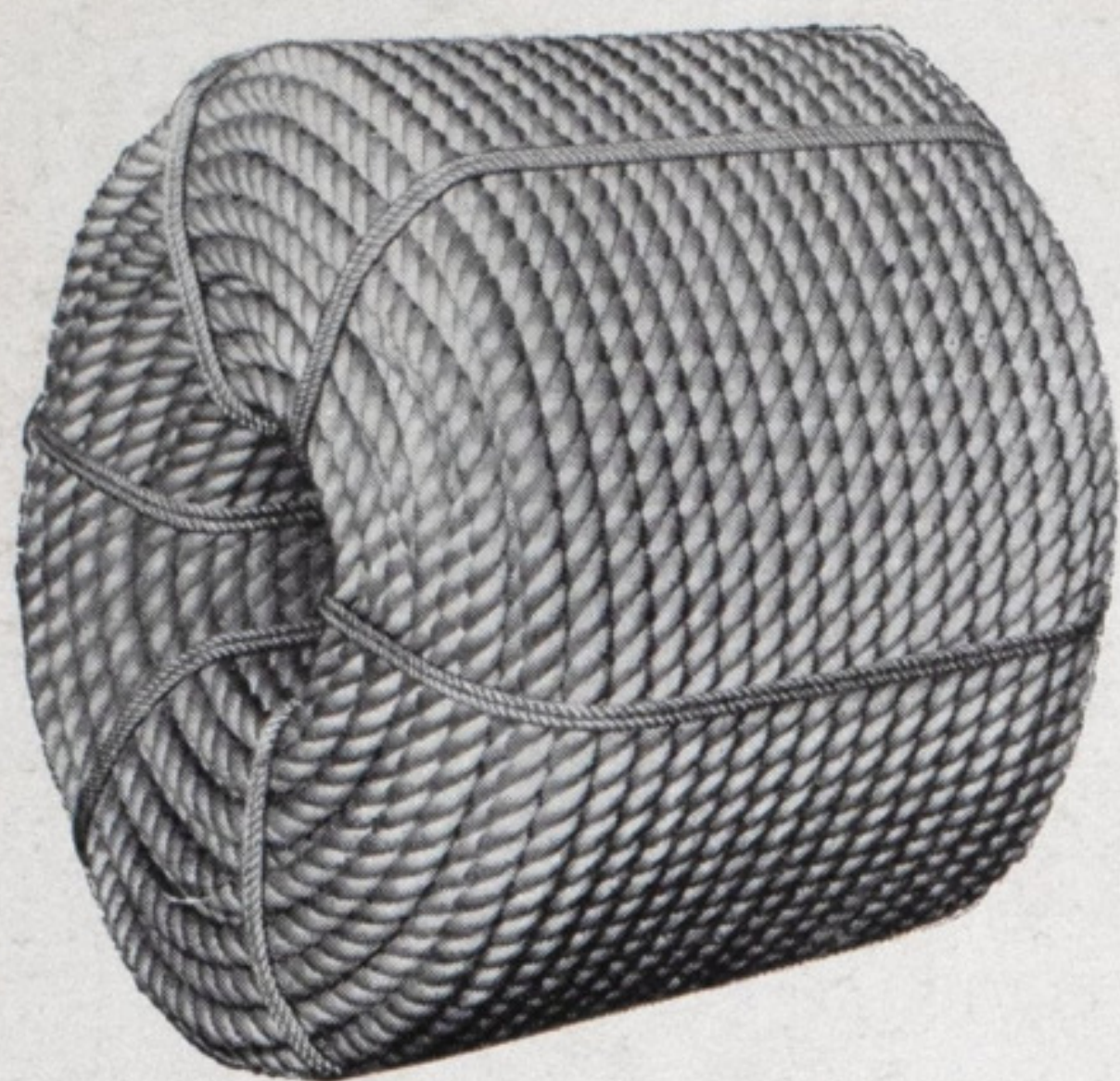
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